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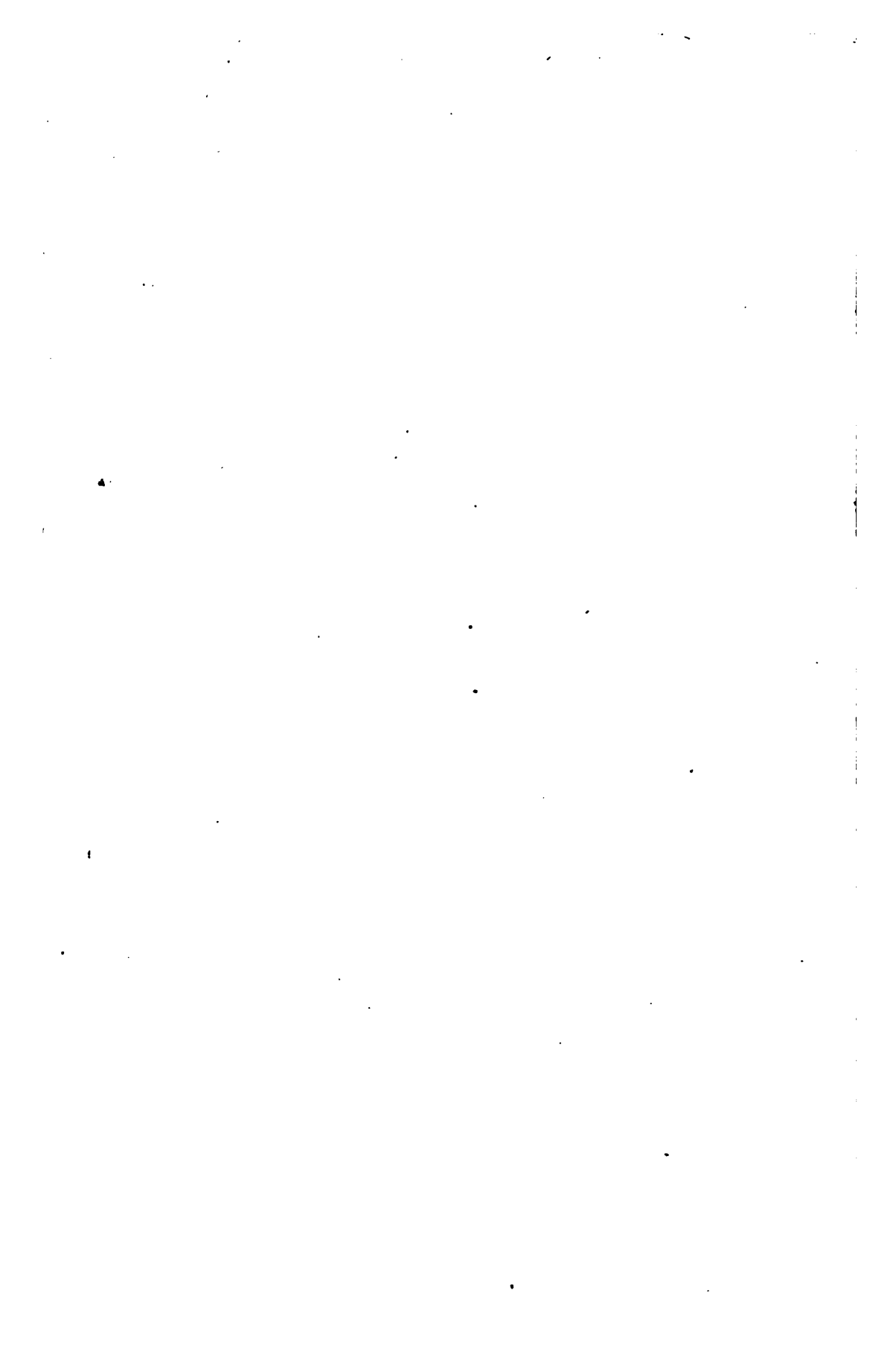
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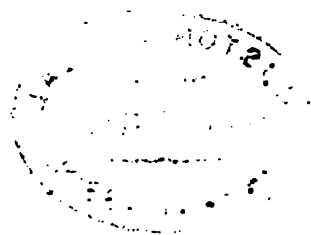
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ANNUAL
OF THE
UNIVERSAL MEDICAL SCIENCES

A YEARLY REPORT OF THE PROGRESS OF THE GENERAL
SANITARY SCIENCES THROUGHOUT THE WORLD.

EDITED BY


CHARLES E. SAJOUS, M. D.,

AND

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ASSISTED BY

OVER TWO HUNDRED CORRESPONDING EDITORS, COLLABORATORS,
AND CORRESPONDENTS.

Illustrated with  Chromo-Lithographs, Engravings and Maps.

VOLUME I.



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PREFACE.

'IN presenting the fourth series of the ANNUAL to the profession, the editor is again obliged to acknowledge some, though slight, delay in its publication. Sickness once more prostrated several members of the editorial staff, while many of those who were not so afflicted were kept exceedingly occupied, owing to the continued prevalence of epidemic influenza. Much delay was thus occasioned in the preparation of several articles. Of the three secretaries assisting the editor in the work of revision, classification, comparison, translation, etc., one was unable to attend to duty during the entire period of preparation, owing to a severe attack of typhoid fever; a second, it was the editor's great sorrow to lose by death from acute pneumonia. The intricacy of the work rendering it practically impossible to train new assistants so as to insure timely usefulness, the members of the profession will surely appreciate how deeply indebted the editor feels toward his remaining secretary, Miss N. I. McCarthy, for the devotion shown in her efforts to as much as possible annul the great difficulties of the situation.

Notwithstanding these unfavorable circumstances, it is a pleasure to be able to express the belief that the ANNUAL of 1891 is fully up to its predecessors in the value of its individual articles. In fact, it might be added that a greater degree of uniformity prevails. This is entirely due to the efforts of the associate editors, whose valuable work is entitled to the highest appreciation.

The general plan and logical sequence observed in the ANNUAL of last year has been continued in the present issue. The practical advantage to compilers of a reference-list at the end of each volume having been suggested by some of the patrons of the work, and by our much-esteemed contemporary, *The Medical Chronicle*,

this addition was made, without, however, reducing the amount of text presented.

The editorial staff of the *ANNUAL* suffered a great loss in the death of their very distinguished colleague, Professor Joseph Leidy, of Philadelphia, who departed this life on April 30, 1891. His scientific attainments have placed his name among the brightest of ever-shining lights; his modesty and his general nobility of character have made him a model to all men. Such a man never dies—he but leaves his material form to acquire his spiritual reward after more than accomplishing a mission entrusted to him by his Creator. Those he leaves behind him appreciate more than ever how much they loved him.

It is also with deep sorrow that the editor must record the death of Dr. Lubelski, of Warsaw, Poland, corresponding editor. Dr. Lubelski's many qualities as a man, physician, and author won him an enviable reputation, and he will be missed by a large circle of friends at home and abroad.

To his publisher, Mr. F. A. Davis, the editor wishes to express his thanks for material help in overcoming the many unfortunate circumstances tending to delay the publication of the work; and to Dr. C. S. Witherstine, of Germantown, for valued assistance in the revision of proof-sheets, and for other kindnesses.

It is indeed a source of satisfaction to express great appreciation of the painstaking efforts of Mr. H. B. Van Horn, manager of the typographical department, to reduce as much as possible the inevitable delay incurred. Thanks are also due to Messrs. Burk & McFetridge for the excellence of their chromo-lithographs, and the promptness with which the work was done; and to Oldach & Co., binders, and Fickinger & Stowell, wood-engravers, for the manner in which their share of the labor was executed.

THE EDITOR.

PHILADELPHIA,
May 20, 1891.

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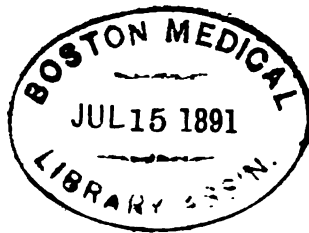
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DISEASES OF THE LUNGS.

By JAMES T. WHITTAKER, M.D.,

ASSISTED BY

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CINCINNATI.

PNEUMONIA.

Etiology.—Mosler,⁶ in a paper read before the Greifswald Medical Society, gave in detail a series of acute pneumonias in a family where there seemed every reason for believing that contagion was the cause of the spread of the disease. He thinks the father acquired the disease outside, and it was conveyed in turn to the members of his family through the sputa. Examination by Grawitz of some of the fluid drawn from the lung showed bacilli resembling rabbit-septicæmia, but neither the pneumobacillus of Friedländer nor the pneumococcus of Fraenkel was found. He believes that many varieties of poison may give rise to pneumonia, but that the main lesson in the case is the contagiousness and the need of a careful disposal of the sputa by disinfection or otherwise. Pietrzkowski,³ calls attention to the frequency of pneumonia after strangulated hernia, both when relieved by taxis and by herniotomy. He records this clinical observation as made on 400 cases. The result of his experimental observation was that, of 150 dogs in which artificial herniæ were made and then reduced, 10 showed marked lesions of the lungs and in 6 lesions of the liver were observed. In all cases thrombus was the cause. Buchmueller⁸⁶¹ reports on an epidemic of pneumonia in which he could not exactly point out a contagion from person to person, but was of the opinion that the exciting cause of the disease spread over the place like a kind of miasma.

Williams,² is of the opinion that pneumonia is a blood and not a lung disease, and resembles in its course the zymotic diseases. Gwynne² reports an epidemic of pneumonia which occurred in Sheffield. In some cases it was possible to trace the attack to

distinct infection. Herbert⁶_{May 17} reports a case of pneumonia from a peculiar cause. A young Arab died shortly after admission. Post-mortem examination showed the lower left lung in a state of gray hepatization. In dividing the root of the lung a common male round-worm was cut across; its tail end lay in the main bronchus, whence it extended downward into the posterior part of the lung, then to the smaller bronchi, where its head filled the tube in which it lay. The worm was alive, 4.75 inches long, and paler in color than three other large female ones found in the stomach and duodenum. Bozzolo⁶⁷_{Oct. 15} reports having found the diplococcus in the milk of a patient who was suffering from pneumonia. Sokoloff,⁸⁵⁰_{Feb. 29; Sept., Oct.} after careful observations on 2360 cases, concludes that there can be no doubt that croupous pneumonia is an infectious disease, which is (in hospitals) transmitted from patient to patient, or from neighbor to neighbor, much the same as erysipelas. By isolation and disinfection he has succeeded in reducing the complications in pneumonia from 35 to 15 in one year. He recommends that every hospital keep special wards for patients suffering from pneumonia, and wards which have been occupied by pneumonic patients should only be used by others after the most careful disinfection. Townsend⁹⁹_{Mar. 27} reports a long list of cases occurring in Boston, of which, though many of them may be simply coincidences, some, at least, bear out the idea of infectiousness as regards acute lobar pneumonia.

Levy⁸²⁷_{Jan.; Aug.}⁵ reports a case of fibrinous pneumonia of congenital origin. The mother died of fibrinous pneumonia complicated with pleurisy and pericarditis. The chest was aspirated and a sero-purulent fluid removed, which gave cultures showing the diplococcus of Fraenkel and Weichselbaum. Inoculations were made with the fluid, which demonstrated the presence and potency of the germ. The child of this woman, born thirty-six hours before her death, died two days after birth of hæmorrhagic catarrhal pneumonia, with lobar fibrinous pneumonia, and the autopsy demonstrated the fact that the pneumonia from which the child died was infectious, and had persisted at least thirty-six hours before the child was born. Cultures made from fluid drawn from the left ventricle of the heart and from the right lung demonstrated the presence of the diplococcus; the micro-organisms were especially numerous in the blood, and the conclusion was reached that

the infant was infected through the mother. Platani⁶⁷_{Dec. 18, '99},⁹⁹_{Jan. 20} has produced pneumonia by inoculating the microbe by the natural passages, at the same time favoring the result by aseptic traumatism of the lung through the thoracic parietes, or causing the animal to inhale irritant gases, as ammonia, hydrochloric acid, etc. He has found some degree of traumatism at the point of inoculation to be necessary, as thus the vital resistance of the lung is weakened. It was not enough that the pneumococcus be simply inhaled, and all such experiments failed to produce the pneumonia. Animals after inoculation, placed in a frigorific apparatus, invariably succumbed after a brief time; they invariably succumbed more readily, had a more elevated temperature, and more extensive pneumonic lesions than animals similarly inoculated, but not exposed to cold. He then studied the action of chilling alone, with negative results.

Crocq⁶_{Aug.} declares his disbelief in the causes of the disease being either Friedländer's bacillus or the diplococcus of Fraenkel and Weichselbaum. His experiments were negative. Bordas¹⁷_{Feb. 1},²⁶_{Apr. 1} finds the following as the result of his researches: The true pneumococcus is found in all fatal cases of pneumonia; it has also been found in the fluids of the inflamed ear after influenza; the blood contains no trace, but the spleen frequently has traces of this micrococcus; the streptococci seem characteristic of bronchitis and broncho-pneumonia of influenza, but not of true pneumonia; they differ only by the extent of their inflammation multiplication; the disease is infectious, and may even become contagious. The bronchitis of influenza, according to Bordas, is characterized by streptococci, the pneumonia by pneumococci. Sée and Bordas⁸_{Jan. 20} made an extensive report of their researches for the pneumococcus in fibrous pneumonia consecutive to the grippe. Their researches lead them to consider pneumonia not only as a local malady of infectious origin, but also as a disease which may become infectious in the sense that it may invade other organs. Jaccoud²⁷⁰_{Apr. 1},²⁰²_{Apr. 25} relates an interesting case where a man suffered from a facial neuralgia associated with an irritation and hypersecretion of the right frontal sinus. These two conditions were coincident and came on with mathematical periodicity,—a periodicity pertaining to the day, hour, and minute. Recovery was very prompt under quinine; pneumococci were found very numerous in the secretions; this led him

to think of the otitis which occurred in the late influenza, but the patient did not have the influenza. According to Netter, when one has had the pneumonia he has pneumococci always in his saliva, but this patient never had pneumonia. Observations have multiplied which show that the pneumococcus is not noxious.

Debove²²⁸_{v. 30, Feb.}⁹⁰ reports a case of meningitis and peritonitis having pneumococci, but in which pneumonia was not present. Netter, in discussing the report, said that pneumococci in peritonitis was very rare; it did not occur in 108 autopsies in which he had looked for it. He has met with meningitis with pneumococci in 21 out of 33 cases, and he has collected 45 cases by other authors in which it has occurred 27 times. Queisner⁹_{May 10} has examined the lungs in a number of children and adults suffering from pneumonia, and he finds the coccus of Fraenkel and Weichselbaum the usual bacterial cause of true croupous pneumonia. Devoto²⁴_{Jan.} has made a large number of examinations of the kidneys of patients who have died of pneumonia. He found only inflammatory changes, and the Fraenkel diplococcus was never present. He recalls the investigations of Luccatello, which went to prove that the blood of persons afflicted with pneumonia is generally free from pneumococci. Canfield⁷⁴_{Oct., '99} at the Johns Hopkins Hospital pathological laboratory, Baltimore, has isolated Fraenkel's diplococcus from the blood and tissues of rabbits killed with Sternberg's sputa. He has also obtained the same organism from rabbits killed with prune-juice expectoration. Sturgis and Coupland¹⁰⁴⁴_{Oct. 4}; ² in regard to direct infection, assume a wise reserve qualified with skepticism. The vexed pathological question as to whether the disease is general or local, zymotic or idiopathic, is approached in a spirit of compromise.

Complications.—Schaffer³⁴_{v. 23, No. 34, '99} reports a case of herpes ophthalmicus which came on five days after a left-sided croupous pneumonia. He believes, with Weigert and Kaposi, that herpes zoster is an infectious disease, and that erysipelas, pneumonia, and zoster are children of the same *genus epidemicus*. Aufrecht¹⁵⁸_{v. 11, p. 361} describes cases of hemiplegia following pneumonia of the superior lobes in children. He considers that, similar to what occurs in uræmia, the pneumonia paralysis is occasioned by extension of the œdema into the brain-substance. This is rendered possible through the changes in the blood, and is especially easy of occurrence in

pneumonia of the superior lobes, as in this case the flow of the venous blood to the heart is made more difficult. Phillips¹⁰⁴⁸_{v.2,p.171} reports an interesting series of cases where acute, non-septic pneumonia followed as a complication of the puerperal period. Olivia⁵⁰⁵_{Nov.28-30, 79} describes pneumonia with icterus in three different classes, viz., pneumonia with icterus in consequence of venous stasis in the liver, pneumonia with icterus from stoppage of the gall-duct, pneumonia with icterus from general infection. Kidd⁶_{Apr.5} affirms the existence of a subacute lobar pneumonia distinct from the acute classical type, characterized by a tendency to fibrous and necrotic changes in the lungs. The indurative process may be mainly or exclusively interstitial; it may be represented wholly or in part by organization of an alveolar exudation, or may comprise both of these lesions. The anatomical differences may imply a corresponding difference in etiology, but for clinical differences both forms may be included under the title "indurative pneumonia," which indicates the characteristic features common to both.

Tidball¹⁸⁶_{Nov} speaks of the importance of the pulse as an index to the condition of the heart in pneumonia. If frequent or slow, or compressible, it shows debility of the heart-muscle; and the change of position from reclining to upright, or, coupled with the exertion attending the use of the vessel to evacuate the bowels or empty the bladder, may so distend the heart that, in the debilitated condition of its walls, the muscle is paralyzed or a clot is formed, or both of these conditions may be present. Cimbali⁸_{Jan.10;} ³⁴_{Feb.10;} ⁵_{June} concludes that delayed resolution in pneumonia occurs in debilitated individuals, particularly in malarial cachexia and almost always in severe cases, as a result of cardiac weakness. After the crisis the physical signs remain unchanged, the sputum pneumonic, and often there are occasional evening rises of temperature. The author thinks that a pneumonic lung, where resolution has taken place, forms a favorable nidus for the growth of the tubercle bacillus, and on this account patients in this stage are to be carefully guarded against tubercular infection. Mosny³_{Feb.10;} ⁹_{Apr.5} presented to the Paris Academy of Medicine a clear case of erysipelatous pneumonia which occurred in a girl who, while nursing a patient with facial erysipelas, was taken with pneumonia and died in two days. The autopsy showed a very limited area of lung-tissue, which presented the lesions of broncho-pneumonia demonstrated by histological

examination. Bacteriological cultures showed characteristic colonies of the streptococcus of erysipelas without the presence of any other micro-organisms. Other cases were reported. Laboullière reported 6 persons successively taken with pneumonia, all ending in death. He thought there was no question but that the contagious agent was the micro-organism of erysipelas in every one of these cases. A similar case was also mentioned by Mosny, as reported by Strauss.

Brouardel¹⁰⁰_{Feb. 12} reports a case of erysipelalous broncho-pneumonia which he thinks is the first in which this origin of the disease has been conclusively demonstrated.

Heimann⁴_{Oct. 1} and Menzies²_{Nov. 22} report cases of pneumonia resulting from injury.

Treatment.—Crocq²⁸⁸_{July 27; Jan. 2} gives plumbi acetatis in 40 centigrammes to 1 gramme (6 to 15 grains) in twenty-four hours. Treatment can be prolonged to fifteen days. The indications for this treatment are, pneumonia in a vigorous subject, with pronounced inflammatory action, with bloody expectoration; also, the pneumonia of debilitated and broken-down persons, alcoholics, and diabetics. Chittic²³⁴_{June} advocates mustard-leaves and cotton and an oil-silk jacket in preference to poultices, which are heavy and wet. He checked the initial chill in one case by two doses of $\frac{1}{16}$ grain (0.00065 gramme) of nitro-glycerin. He always used the carbonate of ammonia first and alcohol next, but resorted to nitro-glycerin when these were unsatisfactory. Cornell²⁸²_{Sept.} reports 2 cases of very severe and sudden onsets of pneumonia, which he treated very successfully by phlebotomy. From the one 16 ounces (500 grammes), from the other 8 ounces (250 grammes) of blood were withdrawn from the median basilic vein. Stowell,⁵⁹_{Nov. 1; Dec. 10}¹⁴⁷ in a study of 100 cases in children under 10 years of age, has found treatment in unsanitary quarters not so unpromising as would be suspected. Alcohol is not needed; antipyretics weaken a child more in proportion than they do an adult. Many mild cases become severe and fatal in spite of treatment, and no cases are so bad that the physician should not do his utmost to save. Many cases get well with little care and less medicine.

Waugh,⁷⁸⁰_{May 17} has had quite prompt results from 30 grains (2 grammes) of citrate of potash and 5 grains (0.32 gramme) of the nitrate every two hours. He also has the chest rubbed with thap-

sia ointment, 15 per cent., in oleite. Bigg²²⁴ sums up treatment in the terse statement, "Sustain the heart and husband the nerve-force."

Welch,⁵⁹ treats alcoholic delirium in pneumonia with chloral and digitalis in frequently-repeated doses. Netchaeff¹⁰⁷ reports favorably on the use of the tincture of capsicum in the pneumonia of alcoholics. Clemens¹⁰⁷ has great success with the administration of chloroform. At the end of twelve hours the fever is abated. Alcohol may be mixed with the chloroform. The inhalations produce the defibrination of the blood in the lungs, and thus prevent hepatization. The drug also, doubtless, has a dynamic action on the brain and pneumogastric nerve. A case is also reported by Phillipi.²⁵

Winnett,²⁵⁷ Knox,¹⁴⁰ Carson,¹⁹ Parham,¹¹⁷ Hodge,¹⁹ Hyten,¹⁹⁰ Bodley,¹⁹⁰ Pratt,¹⁹⁰ Waugh,⁷⁰⁰ and Collins¹⁹⁰ favor the use of ergot in pneumonia, a favorite combination being with tincture of gelsemium. Chambers⁶ reports favorably on the continuous use of oxygen gas. Simpson⁶ has used with benefit a new form of bleeding, which he terms pulmonary phlebotomy, and which consists of thrusting the aspirator needle directly into the engorged lung and relieving it of accumulated blood. Pignol⁷⁰⁰ has been experimenting on tracheal injections in the treatment of pneumonia. The patients were subjected to an injection of naphthol, 20 centigrammes to 1000 of water. One received four injections, the other only two. The injections were well tolerated, and did not cause any complications. The patient said there was an immediate diminution of dyspnoea, and shortly afterward râles were heard in points where there had been souffles. In one case the fever fell while the pneumonia was just commencing. In others there was considerable amelioration.

BRONCHITIS.

Acute capillary bronchitis, supervening, apparently, from secondary infection, has been observed by Duflocq and Ménétrier,³⁸⁰ and attributed by them to pneumococcus. As the results of recent investigations into the pathogenetic activities of the pneumococcus other than as a cause of pneumonia, they found the lesions of the tuberculous and bronchitic infections co-existing but not co-extensive, the anatomical relations being such as to

leave no doubt of the priority of the tuberculous process. The lesions of tuberculosis were found principally in the upper lobes, and the capillary bronchitis in the middle and inferior portions of the lung regions, which were relatively free from bacillary localization.

The differential diagnosis between spasmodic bronchitis and whooping-cough receives careful study by Delaye.¹⁸⁸_{May 2} Plastic bronchitis is described by Allen.⁵⁹_{Apr. 5} West.⁵⁹_{Jan. 16} collected 52 cases up to date from literature, and found the majority of cases to be of the recurrent type. West himself had 1 case in a woman aged 40, the attacks recurring at intervals for two years. Roberts.²²_{Nov. 12} reports a case in which the attacks came on daily for ten months. Lindsay.²_{May 10} also cites a case. Lubbock.²_{Mar. 21} reports a case at Charing Cross Hospital. Pacchini reports 3 cases of primary fibrinous bronchitis, and discusses particularly the etiology. Weist.⁵⁹_{May 24} presented to the Army Medical Museum, at Washington, exceedingly perfect casts of the bronchial tubes taken from a woman who frequently expectorated these casts.

Treatment.—Sprays are highly recommended by Murrell.⁶_{May 24}: wine of ipecac, 2 drachms (8 grammes), used at a daily sitting, repeated from four to eighteen times; tartar-emetic sprays, 1 grain (0.065 gramme) to 1 ounce (31 grammes) of water, or antimonial wine and water, equal parts; lobelia spray, if there is much spasm; iodide of potassium, 2-per-cent. solution. Inhalations of steam night and morning helps the expectoration. The addition of compound tincture of benzoin, creasote, or carbolic acid is of assistance.

Waugh.⁷⁸⁰_{May 25} recommends the acetate of morphine with the acetate of potassium, 20 grains (1.3 grammes), every two to four hours. Everson.¹⁴⁴_{Mar.} has found a combination of salicylate of sodium, nitrate of potassium, and Dover's powder very efficient in the treatment of the chest pains in bronchitis, 2 grains (0.13 gramme) each of these to be given every three hours. This combination also allays the existing inflammation. Murrell.⁷⁸⁰_{Nov. 20, '99} highly recommends the chloride of ammonium, especially as an inhalation. An editorial.¹⁷⁶_{June} recommends terebene as a stimulant, antiseptic, expectorant, and diuretic. Wilcox.⁵⁹_{Jan. 11} has experimented quite successfully with a concentrated tincture of cocillana, a bark of an undetermined species of guarea discovered in Bolivia in 1866. It was given in doses of $\frac{1}{4}$ to 2 fluidrachms (2 to 8 grammes)

every two to eight hours. Its action was stimulative for some hours of the vessels and glands of the mucous surfaces, more especially of the respiratory tract, with subsequent sedation. An increase of appetite was also observed. He believes the fluid extract, in from 5 to 25 minims (0.32 to 1.62 grammes), two to eight hours, would be better. Main⁵⁹_{Jan.11}; ²_{Nov.20, '98} has found iodide of ethyl in 10-minim (0.65 gramme) doses, sprinkled on a handkerchief and inhaled, very beneficial in cases of bronchitis complicated with Bright's disease and fatty heart, with feeble circulation. It is especially useful when the bronchial secretion is viscid and there are urgent symptoms of dyspnoea. About five minutes after the inhalation the patient coughs and expectorates, which relieves the distressing symptoms.

PLEURISY.

Cameron⁸⁹_{Jan.1} reports a case of chylous pleurisy, and mentions 64 cases of chylous effusion reported by Busey,⁸⁹_{Jan.1} 10 of which were chylo-thorax. Cameron exhibited to the society two samples of the fluid. These were both of a thick, white, milky appearance; one had coagulated, the other not. Willerding²⁰⁵_{v.46,p.498} cites an interesting case of mania, which developed after typhoid fever following childbirth, but completely disappeared after an attack of pleurisy. Megnin and Veillon³_{Apr.20} found a condition among dogs which simulated the purulent pleurisy. The streptococcus was found. Burino³¹⁹_{Dec.2, Feb.1} describes pleuritis pulsans, and says a difference must be made between the visible pulsation in pleuritis pulsans, pulsus exopleuricus, and the latent pulse, pulsus endopleuricus; this latter can only be detected and traced when the pleural space is bound with a manometer apparatus. The pulsus exopleuricus is not so rare a phenomenon as generally believed, and the pulsus endopleuricus is a symptom which is present in almost all copious pleural effusions, particularly in left-sided ones, which are attended with considerable pressure, displacement of the heart, and compression of the lungs. Smith⁹_{July} discusses at length the etiology of pleuritis, especially in reference to tuberculosis. He thinks the assertion that a large majority of cases not traceable to ordinary causes are tubercular cannot be clinically proven, and that the assumption is only from inference. If so large a number of pleurisies are tubercular, as is generally supposed, recovery from tuberculosis of the pleura is very much more frequent than from

pulmonary tuberculosis. Netter²_{Jan. 7} maintains that all forms of pleurisy are of microbic origin, but that the microbes producing them are of many different kinds. He has made bacteriological examinations of 109 cases of different kinds of purulent pleurisy and found in them pneumococci, pyogenic streptococci, pyogenic staphylococci, the bacillus tuberculosis, Friedländer's encapsulated bacillus, the pseudo-typhoid bacillus, micrococcus tetragenus, spirilla, filaments of leptothrix, and saprogenic bacteria. Coustan and Dubrulle,²⁴⁸_{July, Aug.} in an extensive article on pleurisy in the army, cites the frequency of this disease in this class of subjects, particularly from 19 to 23 years of age. Engster³²⁶_{R. 46, A. 3-4} has tabulated all the cases of primary pleuritis which occurred in the clinic at Zurich in ten years, amounting to 163 cases. He found that it often commenced like an infectious disease. Liebermeister⁶⁹_{Nov. 10-12, May 2} observes that physicians who frequently resort to percussion may for weeks together treat a patient for gastric catarrh, while, in reality, he suffers from an extensive pleural effusion. He can give no means of discrimination between purulent and non-purulent effusion. Prevost⁸⁹_{Mar. 17} says that if the face be pale, the nostrils dilated, the voice broken, with an inclination to take breath in the middle of a sentence, then think at once of an abundant pleural effusion. Barrs²_{Jan. 26, May 10} says the immediate prognosis in pleuritic effusion is almost always favorable; the remoter prognosis, however, should be most carefully guarded. A careful study of the lung in the neighborhood of the effusion is more important as regards the prognosis in any given case than the study of the effusion itself. Weill¹_{Feb. 1} reports 27 cases in which pleurisy resulted in sudden death, the patients having no warning of their approaching dissolution. He found, from these cases and careful study of the subject, that the chief lesions which might produce sudden death in pleurisy are thrombi and emboli of the pulmonary artery, œdema of the lung of the sound side, and diseases of the heart-muscle.

The *aphonie pectorilique*, or whispering voice, or Baccelli's sign, was found to be very distinct in a case reported by Fussell.¹¹²_{July} Baccelli claimed it to be of great value in diagnosis between serous and purulent effusions, being always present when the effusion is purely serous, and absent when sero-purulent or purulent. He explains that the sound is readily transmitted by a homogeneous fluid like serum, but not by a fluid containing elements of different

consistency. Rumino⁵⁹_{Sept. 4} has satisfied himself, after extensive investigation, that the sign is a reliable one. The conductivity of the thorax for the whispering voice was influenced solely by the number of corpuscular elements contained in the exudate, and not by intra-pleural pressure, the amount of fluid, or the condition of the pleural surface. Bacteriological studies of pleurisy have been made by Patella,⁵⁷_{Nov. 16; Oct. 20} Luzzatto,⁵⁷_{Nov. 16; Oct. 20} Letulle,³_{June 4, Oct. 16} Jaccoud,¹⁰⁰_{Dec. 24, '99} Talamon,³_{Dec. 6} Netter,³_{Dec. 6} Levy.²⁷³_{July} The latter writer investigated 54 cases,—37 serous, 7 purulent. He found that in most sero-fibrinous effusions there were no micro-organisms. The presence of staphylococcus pyogenes in a serous effusion does not mean that it will necessarily become purulent. Absence of organisms in empyemata points most probably to a tubercular origin. Presence of diplococcus in metapneumonic serous effusions does not prove they will become purulent. Exclusive presence of Fraenkel's pneumococcus usually justifies a good prognosis, notwithstanding the radical operation is the best.

Treatment.—Otto,⁴_{Nov. 20, '99} has an article on the treatment of pleuritic pain by pressure, by which means he has attained considerable success. Fernet,⁸_{May 17} has had good results from antiseptic injections in purulent pleurisy. Ossovsky⁵⁸⁸_{Nov. 16, '99} has tried chloride of sodium in 5 cases of obstinate stationary exudative pleurisy, the treatment being commenced after the subsidence of fever and other acute symptoms. The dose was a tablespoonful every two hours of a solution which represented 7.5 grains (0.5 gramme) of chloride of sodium. In all cases a complete absorption of the fluid occurred in a week or so. Under this remedy the patient's stools became regular and normally constituted. Ander,⁷⁸⁰_{Feb. 4, May 16} thinks the syrup of the iodide of iron and the compound syrup of the iodide of iron and manganese the best absorbents we have for these cases.

Pedigo¹⁸⁸_{July} highly recommends the use of the syrup of hydriodic acid. Pepper,²⁰²_{Nov. 20} says that if during aspiration the patient begins to cough,—first a little, dry cough; then a spasmodic effort,—it is a sign that the lung is bound down too firmly to readily expand. This demands immediate withdrawal of the trocar. The operation may be performed again, however, in a few days or weeks. If this warning cough is ignored, after the operation we may have a profuse expectoration—slightly ropy, frothy, and albuminous—pouring forth from the bronchial tubes in large quantities. This is an

indication that the withdrawal of the fluid has been carried beyond the limits of propriety. Again, following this warning cough may come sudden death. The excessive aspiration has been the cause of disturbance of the heart and great blood-vessels. Harris²_{May 10, 81} emphasizes the necessity of getting the patient out of bed as soon as possible in the post-operative treatment, and, further, of getting him into the open air without delay. By attention to these points the long period of convalescence will probably be cut short, and in cases where there is an open wound the discharge will be diminished. When the discharge is small, as $\frac{1}{2}$ ounce (16 grammes) per day when there has been an incision, have the patient expand his chest by regular and frequent but moderate dumb-bell exercise, or by drilling. The best results obtained have been when he insisted upon regular muscular exercise. The extraordinary muscles of inspiration are thus brought into play, the lung expands more completely, and the chest-cavity, which always has a tendency to diminish in pleural effusions after operation, has a chance to return to its normal capacity.

The treatment of serous exudative pleuritis with sodium salicylate has been successful in the hands of Tetz.¹¹⁶_{No. 7; Nov. 1} He found that in some cases a rapid cure followed the early use of the salicylates, and that the average duration of the disease is lessened. He even thinks that exudation of several weeks' standing will yield to the salicylate treatment, and this is true of secondary as of primary pleuritis. He often avoids operation for empyema by the use of sodium salicylate. The dose for adults is 1 gramme (15 $\frac{1}{2}$ grains); on the first day four, five, or six doses are given, and for the eight to ten subsequent days three or four doses per day. It soon lessens temperature and increases urinary secretions. Should no improvement follow, he has every reason to suspect that the exudate has become purulent, and has generally found it to be the case. Drzewiecki,¹¹⁶_{No. 7; Sept.}¹⁶¹ after clinical experiments, concludes that pleural inflammations which resist all other forms of treatment yield to full doses of sodium salicylate. He also speaks highly of salol, which is better tolerated by the stomach, given 8 to 12 grains (0.52 to 0.78 gramme) daily. 'Wenci¹¹⁶_{No. 7; Sept.}¹⁶¹¹ gave 20 grains (1.3 grammes) without noting any toxic effect, the earliest of which is brown-colored, cloudy urine. Moussons¹⁸⁸_{Oct. 1} successfully treats by means of intra-pleural injections of bichloride of mercury.

TUBERCULOSIS.

The year 1890 has been made memorable in the history of medicine by the discovery by Robert Koch of an agent which antagonizes the effects of the tubercle bacillus in the body,—an agent the product of the bacillus itself extracted by a 50-per-cent. solution from the culture-soil in which the bacillus is grown. Introduced by subcutaneous injection into any part of the body, the bacillus is thrown off in a mass of necrotic tissue, the removal of which by nature or art cures the disease. It is needless to say that no discovery ever made in medicine promises to contribute so much to the sum of human happiness or the span of human life.

Time alone may determine how fully this promise may be fulfilled, but no one may fail now to recognize the fact that in this first direct address to the cause of the disease the path has been broken that must lead to its ultimate extinction.

The first intimation of this discovery was given to the world in a modest paper¹⁰⁴¹ read at the first general session of the Tenth International Congress, at Berlin, August 4, 1890.

After some preliminary remarks on the contributions of bacteriology, the author speaks of the endeavor made on all sides to discover a cure for the disease and attributes the failure hitherto experienced to the fact that experiments have been made with the disease rather than with the cause. Hence, everything so far suggested or tried, from the benzoate of soda to hot air, had turned out an illusion.

Experiment with the parasite itself and then with lower animals has furnished most promising results. "It is only when experiments on animals have succeeded that we are justified in turning to man."

The author found, in the course of time, many substances that had effect on the growth of the tubercle bacillus in pure cultures. There are, indeed, not a few which arrest their growth. It is not necessary to destroy them; it is sufficient to stop their growth to make them innocent to the body. Of these inhibitory agents the most powerful in very small quantity are a number of ethereal oils, among the aromatic compounds β -naphthylamine, paratoluidin, xyloidin; some of the dye-stuffs, especially fuchsin, gentian violet, methylene blue, chinoline yellow, aniline yellow, auramine; among the metals, mercury in vapor, silica-and-gold compounds, and, far

above all others, the cyanide-of-gold compounds, which, in a dilution of 1 to 2,000,000, arrest the growth of the tubercle bacillus.

All these substances, however, proved perfectly worthless when tried on tuberculous animals. In continuing his observations, the author at last discovered agents which arrested the growth of the bacillus not only in a test-tube, but also in the body of animals; so that at the present time he is able to state that when the extremely sensitive guinea-pig is tuberculized the development of the disease may be arrested by the inoculation of one of these agents, or, if previously inoculated, the inoculation of the disease fails to take. These agents are also perfectly innocuous to the body of the animal.

Koch⁶⁶_{Nov. 14}; ⁹_{Nov. 15} next describes the remedy as follows: "The remedy is a brownish, transparent liquid, which does not require special care to prevent decomposition. For use, this fluid must be more or less diluted, and the dilutions are liable to undergo decomposition if prepared with distilled water. As bacterial growths soon develop in them they become turbid, and are then unfit for use. To prevent this, the diluted liquid must be sterilized by heat and preserved under a cotton-wool stopper, or, more conveniently, prepared with a $\frac{1}{2}$ -per-cent. solution of phenol.

"It would seem, however, that the effect is weakened both by frequent heating and by mixture with phenol solution, and I have, therefore, always made use of a freshly-prepared solution. Introduced into the stomach, the remedy has no effect. In order to obtain a reliable effect it must be injected subcutaneously, and for this purpose we have exclusively used the small syringe suggested by me for bacteriological work. It is furnished with a small India-rubber ball, and has no piston. This syringe can easily be kept aseptic by the use of absolute alcohol, and to this we attribute the fact that not a single abscess has been observed in the course of more than a thousand subcutaneous injections.

"The place chosen for the injection, after several trials of other places, was the skin of the back between the shoulder-blades and the lumbar region, because here the injection led to the least local reaction,—generally none at all,—and was almost painless. As regards the effect of the remedy on the human patient, it was clear from the beginning of the research that in one very important particular the human being reacts to the remedy differently from

the animal generally used in experiments, namely, the guinea-pig,—a new proof for the experimenter of the all-important law that experiment on animals is not conclusive, for the human patient proved extraordinarily more sensitive than the guinea-pig. As regards the effect of the remedy, a healthy guinea-pig will bear a subcutaneous injection of 2 cubic centimetres ($32\frac{1}{2}$ minims), and even more, of the liquid without being sensibly affected; but, in the case of a full-grown, healthy man, 0.25 cubic centimetre (4 minims) suffices to produce an intense effect. Calculated by the body-weight, one-fifteen-thousandth part of the quantity which has no appreciable effect on the guinea-pig acts powerfully on the human being.

“The symptoms arising from an injection of 0.25 cubic centimetre (4 minims), I have observed after an injection made in my own upper arm. They were briefly as follow: three to four hours after the injection there came on pain in the limbs, fatigue, inclination to cough, difficulty of breathing, which speedily increased in the fifth hour, and were unusually violent. A chill followed, which lasted almost an hour. At the same time there were nausea, vomiting, and a rise of body-temperature to 39.6° C. (103.2° F.).

“After twelve hours all these symptoms abated, the temperature fell, and on the next day it was normal. A feeling of fatigue and pain in the limbs continued for a few days, and for exactly the same period of time the site of injection remained slightly painful and red. The smallest quantity of the remedy which will affect the healthy human being is about 0.01 cubic centimetre ($\frac{1}{4}$ grain), equal to 1 cubic centimetre ($16\frac{1}{4}$ minims) of the one-hundredth dilution. As has been proved by numerous experiments, when this dose is used, reaction in most people shows itself only by slight pains in the limbs and transient fatigue. A few showed a rise of temperature to about 38° C. (100.4° F.).

“Although the effect of the remedy in equal doses is very different in animals and in human beings, if calculated by body-weight, in some other respects there is much similarity in the symptoms produced, the most important of these resemblances being the specific action of the remedy on the tuberculous process, the varieties of which I will not here describe. I will make no further reference to its effects on animals, but I will at once turn

to its extraordinary action on tuberculosis in human beings. The healthy human being reacts either not at all or scarcely at all, as we have seen, when 0.01 cubic centimetre ($\frac{1}{10}$ minim) is used. The same holds good with regard to patients suffering from diseases other than tuberculosis, as repeated experiments have proved; but the case is very different when the disease is *tuberculosis*. A dose of 0.01 cubic centimetre ($\frac{1}{10}$ minim), injected subcutaneously into tuberculous patients, causes a severe general reaction as well as a local one.

"I gave children, aged from 2 to 6 years, one-tenth of this dose,—that is to say, 0.001 cubic centimetre ($\frac{1}{1000}$ minim); very delicate children, only 0.0005 cubic centimetre ($\frac{1}{2000}$ minim); and obtained powerful, but in no way dangerous, reaction. The general reaction consists in an attack of fever, which usually begins with rigors and raises the temperature above 39° C. (102.2° F.), often up to 40° C. (104° F.), and even 41° C. (105.8° F.). This is accompanied by pain in the limbs, coughing, great fatigue, and often sickness and vomiting. In several cases a slight icteroid discoloration was observed, and occasionally an eruption, like measles, on the chest and neck. The attack usually begins four to five hours after the injection, and lasts from twelve to fifteen hours. Occasionally it begins later, and then runs its course with less intensity."

"The patients are very little affected by the attack, and as soon as it is over feel comparatively well; generally better than before. The local reaction can be best observed in cases in which the tuberculous affection is visible; for instance, in cases of lupus, changes take place which show the specific antituberculous action of the remedy to a most surprising degree. A few hours after an injection into the skin of the back—that is, in a spot far removed from the diseased area on the face or elsewhere—the lupus begins to swell and to redden, and this it does generally before the initial rigor. During the fever the swelling and redness increase, and may finally reach a high degree, so that the lupus-tissue becomes brownish and necrotic in places where the growth was sharply defined. We sometimes found a much swollen and brownish spot surrounded by a whitish edge almost 1 centimetre wide, which again was surrounded by a broad band of bright red.

"After the subsidence of the fever the swelling of the lupus-tissue gradually decreases and disappears in about two or three

days. The lupus-spots themselves are then covered by a soft deposit, which filters outward and dries in the air. The growth then changes to a crust, which falls off after two or three weeks, and which—sometimes after only one injection—leaves a clean, red cicatrix behind. Generally, however, several injections are required for the complete removal of the lupus-tissue; but of this, more later on. I must mention, as a point of special importance, that the changes described are exactly confined to the parts of the skin affected with lupus. Even the smallest nodules, and those most deeply hidden in the lupus-tissue, go through the process and become visible in consequence of the swelling and change of color; whilst the tissue itself, in which the lupus-changes have entirely ceased, remains unchanged. The observation of a lupus case treated by the remedy is so instructive, and is necessarily so convincing, that those who wish to make a trial of the remedy should, if possible, begin with a case of lupus.

“This specific action of the remedy in these cases is less striking, but is as perceptible to the eye and touch as are the local reactions in cases of tuberculosis of the glands, bones, joints, etc. In these cases swelling, increased sensibility, and redness of the superficial parts are observed. The reaction of the internal organs, especially of the lungs, is not at once apparent, unless the increased cough and expectoration of consumptive patients, after the first injection, be considered as pointing to a local reaction in these cases. The general reaction is dominant; nevertheless, we are justified in assuming that here, too, changes take place similar to those seen in lupus cases. The symptoms of reaction above described occurred, without exception, in all cases in which a tuberculous process was present in the organism after the use of 0.01 cubic centimetre ($\frac{1}{25}$ grain), and I think I am justified in saying that the remedy will, therefore, in the future, form an indispensable aid to diagnosis.

“By its aid we shall be able to diagnose doubtful cases of phthisis; for instance, cases in which it is impossible to obtain certainty as to the nature of the disease by the discovery of bacilli or elastic fibres in the sputum, or by physical examination. Affections of the glands, latent tuberculosis of bone, doubtful cases of tuberculosis of the skin, and similar cases will be easily and with certainty recognized. In cases of tuberculosis of the lungs or

joints which have been apparently cured, we shall be able to make sure whether the disease has really finished its course, and whether there be still some diseased spots from which it might again arise as a flame from a spark hidden by ashes.

"Of greater importance, however, than its diagnostic use is the therapeutic effect of the remedy. In the description of the changes which a subcutaneous injection of the remedy produces in portions of the skin affected by lupus, I mentioned that after the subsidence of the swelling and decrease of the redness the lupus-tissue does not return to its original condition, but that it is destroyed, to a greater or less extent, and disappears. Observation shows that in some parts this result is brought about by the diseased tissue becoming necrotic, even after but one sufficiently large injection, and at a later stage it is thrown off as a dead mass. In other parts a disappearance, or, as it were, a necrosis of the tissue, seems to occur, and in such case the injection must be repeated to complete the cure.

"In what way this process of cure occurs cannot, as yet, be stated with certainty, as the necessary histological investigations are not complete; but this much is certain, that there is no question of a destruction of the tubercle bacilli in the tissues, but only that the tissue inclosing the tubercle bacilli is affected by the remedy. Beyond this there is, as is shown by the visible swelling and redness, considerable disturbance of the circulation, and, evidently in connection therewith, deeply-seated changes in its nutrition, which cause the tissue to die more or less quickly and deeply, according to the extent of the action of the remedy. To recapitulate, the remedy does not kill the tubercle bacilli but the tuberculous tissue, and this gives us clearly and definitely the limit that bounds the action of the remedy.

"It can influence living tuberculous tissue only, and has no effect on dead tissue; as, for instance, necrotic cheesy masses, necrotic bones, etc.; nor has it any effect on tissues made necrotic by the remedy itself. In such masses of dead tissue living tubercle bacilli may possibly still be present, and are either thrown off with the necrosed tissue or may possibly enter the neighboring and still living tissue under certain circumstances of the therapeutic activity. If the remedy is to be rendered as fruitful as possible, this peculiarity in its mode of action must be carefully observed.

At first the living tuberculous tissue must be caused to undergo necrosis, and then everything must be done to remove the dead tissue as soon as possible, as, for instance, by surgical interference.

“Where this is not possible, and where the organism is unassisted in throwing off the tissue slowly, the endangered living tissue must be protected from fresh incursions of the parasites by continuous applications of the remedy. The fact that the remedy makes tuberculous tissue necrotic and acts only on the living tissue helps to explain another peculiar characteristic thereof, namely, that it can be given in rapidly-increasing doses. At first sight, this phenomenon would seem to point to the establishment of tolerance; but since it is found that the dose can, in the course of about three weeks, be increased to five hundred times the original amount, tolerance can no longer be accepted as an explanation. As we know of nothing analogous to such a rapid and complete adaptation to an extremely active remedy, the phenomenon must rather be explained in this way: that in the beginning of the treatment there is a good deal of tuberculous living tissue, and that consequently a small amount of the active principle suffices to cause a strong reaction; but by each injection a certain amount of the tissue capable of reacting disappears, and then larger doses are necessary to produce the same amount of reaction as before.

“Within limits, a certain degree of habituation may be perceived as soon as the tuberculous patient has been treated with increasing doses; for, so soon as the point is reached at which reaction is as feeble as that of a non-tuberculous patient, then it may be assumed that all tuberculous tissue is destroyed. Then the treatment will only have to be continued by slowly-increasing doses, and with interruptions in order that the patient may be protected from fresh infections while bacilli are still present in the organism; and whether this conception and the inference that follows from it be correct, the future must show. They were conclusive, as far as I am concerned, in determining the mode of treatment by the remedy which, in our investigations, was practiced in the following manner. To begin with the simplest case—lupus.

“In nearly every one of these cases I injected the full dose of 0.01 cubic centimetre ($\frac{1}{25}$ grain) from the first. I then allowed

the reaction to come to an end, and then, after a week or two, again injected 0.01 cubic centimetre, continuing in the same way until the reaction became weaker and weaker, and then ceased. In 2 cases of facial lupus the lupus-spots were thus brought to complete cicatrization by three or four injections; the other lupus cases improved in proportion to the duration of treatment.

"All these patients had been sufferers for many years, having been previously treated unsuccessfully by various therapeutic methods. Glandular, bone, and joint tuberculosis was similarly treated, large doses at long intervals being made use of. The result was the same as in the lupus cases, namely, a speedy cure in recent and slight cases, slow improvement in severe cases.

"The circumstances were somewhat different in phthisical patients, who constituted the largest number of our patients. Patients with decided pulmonary tuberculosis are more sensitive to the remedy than those with surgical tuberculous affections.

"We were obliged to diminish the dose for the phthisical patients, and found that they almost all reacted strongly to 0.002 cubic centimetre ($\frac{1}{50}$ minim) and even to 0.001 cubic centimetre ($\frac{1}{80}$ minim). From this first small dose it was possible to rise more or less quickly to the amount that is well borne by other patients. Our course was generally as follows: An injection of 0.001 cubic centimetre ($\frac{1}{80}$ minim) was first given to the phthisical patient, and from this a rise of temperature followed, the same dose being repeated once a day until no reaction could be observed. We then increased the dose to 0.002 cubic centimetre ($\frac{1}{50}$ minim) until this was borne without reaction, and so on, increasing by 0.001 cubic centimetre ($\frac{1}{80}$ minim), or at most 0.002 to 0.005 cubic centimetre ($\frac{1}{50}$ to $\frac{1}{20}$ minim).

"This mild course seemed to be imperative in cases in which there was great debility. By this mode of treatment the patient can be brought to tolerate large doses of the remedy with scarcely a rise of temperature. But patients of greater strength were treated from the first partly with larger doses and partly with frequently-repeated doses. Here it seemed that the beneficial results were more quickly obtained. The action of the remedy in cases of phthisis generally showed itself as follows: Cough and expectoration were generally increased a little after the first injection, then grew less and less, and in the most favorable cases entirely

disappeared. The expectoration also lost its purulent character and became mucous. As a rule, the number of bacilli decreased only when the expectoration began to present a mucous appearance. They then entirely disappeared, but were again observed occasionally until expectoration completely ceased. Simultaneously the night-sweats ceased, the patients' appearance improved, and they increased in weight within from four to six weeks.

"Patients under treatment for the first stage of phthisis were freed from every symptom of disease and might be pronounced cured; patients with cavities not yet too highly developed improved considerably and were almost cured, and only in those whose lungs contained many large cavities could no improvement be proved. Objectively, even in these cases the expectoration decreased and the subjective condition improved. These experiences lead me to suppose that phthisis in the beginning can be cured with certainty by this remedy. This statement requires limitation in so far as at present no conclusive experiences can possibly be brought forward to prove whether the cure is lasting.

"Relapses may naturally occur, but it can be assumed that they may be cured as easily and quickly as the first attack. On the other hand, it seems possible that, as in other infectious diseases, patients once cured may retain their immunity; but this, too, for the present, must remain an open question. In part, this may be assumed for other cases, when not too far advanced; but patients with large cavities, who suffer from complications caused, for instance, by the incursion of other pus-forming micro-organisms into the cavities, or by incurable pathological changes in other organs, will probably obtain lasting benefit from the remedy in only exceptional cases. Even such patients, however, were benefited for a time. This seems to prove that in their cases, too, the original tuberculous disease is influenced by the remedy in the same manner as in the other cases, but that we are unable to remove the necrotic masses of tissue with the secondary suppurative processes."

Confirmatory of the original observations of Koch may be mentioned the contribution of Loeffler,⁵⁰ who summarizes the best publications hitherto written regarding the use and effects of the remedy; Fraentzel and Runkwitz,⁶⁰ who reported on the systematic use of the remedy in internal tuberculosis; Levy,⁶⁰ who

describes the first case of lupus; and Kohler and Westphal, on external tuberculosis. Bergmann adds his name to the list in a supplementary edition,⁶⁹ while Dengel⁴_{Nov. 20} contributes an article filled with practical remarks. All these writers, almost word for word, confirm the original statements of Koch.

The brown fluid is issued in vials containing 10 grammes ($2\frac{1}{2}$ drachms), whose stoppers are closed with parchment. The vials are inclosed in wooden bottles, which are wrapped with paper containing exact instructions for use. The fluid is indestructible for a long time, but the dilution for use is easily destructible when it becomes turbid, in which condition it must not be used. To prevent turbidity the diluted fluid must be boiled with every opening of the bottle containing it; but the addition of $\frac{1}{2}$ per cent. of carbolic-acid solution obviates the necessity of boiling.

Dilution is best made by first preparing a 10-per-cent. solution; that is, by adding to 1 cubic centimetre (16 minims) of the fluid 9 cubic centimetres ($2\frac{1}{2}$ drachms) distilled water, or $\frac{1}{2}$ -per-cent. carbolic-acid solution. From this 10-per-cent. solution a 1-per-cent. solution is made in the same way. This last dilution is that proper for an adult; for children the dilution should be greater, *e.g.*, 0.2 per cent. Since the weak dilutions lose potency by long keeping, the dilution should be made fresh as often as is possible. When distilled water is used for dilution, the solution should be kept in sterilized test-tubes plugged with cotton to facilitate the process of boiling over gas or a spirit-lamp. The fluid is introduced by subcutaneous injections between the shoulders or in the loins, and best by Koch's syringe of 1 cubic centimetre (16 minims) contents and $\frac{1}{16}$ cubic centimetre ($1\frac{1}{2}$ minims) scale. The syringe is sterilized in barrel and needle with absolute alcohol, whereby abscess formation is avoided absolutely. Ordinary syringes, if used, must be sterilized in the same way, though the avoidance of abscess is not so sure with this instrument. Exact record of the temperature must be taken, both before and after the injections. It is therefore necessary to make observations every three hours at least one day before, and to continue these observations throughout the treatment. Injections should be made early in the morning, that the subsequent elevation of temperature, which occurs only after the lapse of several hours, may be observed on the same day. Consumptives should receive at first 0.001 or 0.002 cubic centimetre

($\frac{1}{80}$ grain or $\frac{1}{80}$ minim); that is, one or two injections of the 1-per-cent. solution; the dose is then to be cautiously increased. In case of fever over 38.5° C. (101.4° F.) the same dose is to be repeated or omitted; with no or but little fever, the dose should be increased 0.001 or 0.002 cubic centimetre ($\frac{1}{125}$ or $\frac{1}{125}$ minim). When the increase has reached 0.01 cubic centimetre ($\frac{1}{10}$ minim), it may be increased, under vigilance of temperature, to 0.01 or 0.02 cubic centimetre ($\frac{1}{10}$ or $\frac{1}{5}$ minim). When the daily dose has reached 0.1 cubic centimetre ($1\frac{1}{2}$ minims), it need not, as a rule, be raised. It is only in exceptional cases that it may be increased to 0.1 cubic centimetre ($3\frac{1}{2}$ minims) or more. The injections may then be continued with interruptions of one or two days, until all symptoms shall have disappeared. In lupus not too extensive the dose for an adult may begin at 0.01 cubic centimetre ($\frac{1}{10}$ minim), and be repeated as necessary. The same dose may be used in bone, joint, and gland tuberculosis. The genuine preparation is signed by A. Libbertz, Berlin, N. W., Lunebergerstrasse, 28, II.

Lindner⁶⁹_{Dec.18} reports 2 cases in which, although no reaction whatever followed the injections, the local condition was considerably improved. One of the patients was a man who had a large number of fistulæ over the sternum and considerable tuberculous lesions in the lungs. Injections even of doses of 3 centigrammes caused no reaction; nevertheless, at the end of a fortnight the greater number of the sternal fistulæ had healed, and the few that remained open scarcely admitted the end of a probe. Maydl, of Vienna,⁵⁷_{Dec.18} reports the results of experiments which he has made with Koch's fluid from the diagnostic point of view. They do not at all agree with the majority of those which have been recorded by other observers. In 5 cases of undoubted tuberculosis reaction took place, but in 1 of them (a boy aged 10 years) only after a fourth injection of 6 milligrammes ($\frac{3}{100}$ grain). Of 6 perfectly healthy adults used as control subjects, 3 reacted, 1 intensely after 2, another after 5, and a third after 8 milligrammes ($\frac{3}{50}$ grain). In 2 patients suffering from carcinoma marked reaction occurred, the temperature in 1 rising to 39.1° C. (102° F.) after 2 milligrammes ($\frac{3}{100}$ grain), and in the other to 38.7° C. (102.3° F.) after 5 milligrammes ($\frac{2}{50}$ grain). Maydl also refers to a case of very pronounced tuberculosis of the larynx and lungs under the care of Schnitzler, in which the injection of 0.025 gramme caused no

reaction. These facts have, he says, "seriously shaken" his faith in the new remedy as an indispensable aid to diagnosis.

Cornil,² brought the series of lectures which he has been delivering on Koch's treatment at the Hôpital Laennec to a close. He summed up the results which he had so far obtained by the new method. With regard to the various forms of pulmonary tuberculosis, we must now, in his opinion, abandon the greater part of the hopes which were at first entertained. It is useless to think of employing it in acute, galloping, or pneumonic phthisis. In advanced phthisis, where there are large cavities in the lungs, the injections are far from being useful. Even in incipient phthisis Cornil is very doubtful as to their effect. He mentions the case of a boy of 14 whose cough dated from only about three weeks before he came under treatment. The disease was clearly tuberculosis, and Koch's remedy was tried. The injections caused the development of an area of intense congestion at the apex, which went on almost to hepatization; the congestion disappeared after a time, but always returned worse than before after each injection, so that the treatment had to be abandoned. In some cases the injections caused attacks of hæmoptysis; in others abundant pleuritic effusion. In certain cases of chronic phthisis, in which the disease is quiescent, or nearly so, the treatment would, Cornil thinks, be not unlikely to kindle it into fresh activity. In a limited class of cases in which there are cavities communicating freely with the bronchial tubes, with little or no fever and not much impairment of strength, the remedy may do good if it does not cause too violent a reaction. Two patients of this kind, under Cornil's care, gained weight and seemed to derive real benefit from the treatment.

To assist in the absorption of tuberculous products, Heineze⁸⁵¹ proposes the energetic administration of potassium iodide to patients who have undergone a course of Koch's injections, in order to facilitate the absorption of tuberculosis foci. The necrotic focus remains a danger to the whole body. Mikulicz and the author have this treatment in view in the immediate future.

Grancher and Martin⁶ have been, for the last two years, making researches with a view of placing, if possible, the system in a condition of resistance similar to that in which the previously vaccinated are in regard to small-pox, and, in cases where the

infection may already be an accomplished fact, to stem the inroads of the disease by the inoculation of attenuated tubercular virus, as is now done in hydrophobia by the inoculation of weakened virus of rabies. The animal selected for experimental purposes was the rabbit, and the method of inoculation adopted was the intra-venous one, on account of the certainty with which this method sets up acute and fatal tuberculosis, with constant and well-marked lesions of the liver, spleen, and lungs. The disease thus brought about being always mortal, the observers were enabled to appreciate with tolerable precision the positive or negative results of their succeeding experiments. A tubercular culture was prepared from the spinal cords of these animals dead of tuberculosis, and attenuated after the manner adopted by Pasteur in his manipulation of rabic virus, the several preparations being numbered according to the degree of their intensity. Then, by taking healthy animals, beginning with the weakest injections and gradually going on to the stronger, it was found that after a time the animals developed a power of resistance which varied amongst different ones, but in most was of a kind to repel fatal infection from a virus so lethal that fresh animals inoculated with it succumbed in a short time to what was proved post-mortem to be tuberculosis. For instance, 7 rabbits were inoculated on December 31, 1889, with an extremely virulent preparation. Of these, 1 had not undergone any previous inoculation with the attenuated virus, and it died twenty-three days afterward of the communicated disease; 5 of those which had been subjected to, and thus protected by, anterior inoculation, lived 126, 176, 176, 184, and 189 days respectively. As to the sixth, it is even now living, 229 days after the operation. In conclusion, Grancher and Martin claim to have proved that, on the one hand, it is possible by inoculation to evoke in the animal economy a prolonged resistance to the most rapid and fatal form of communicated tuberculosis, and on the other to confer against infection by this disease an immunity, the duration of which, however, remains to be determined. They add that the results obtained by Koch, on guinea-pigs, having been achieved by methods somewhat different, give ground for hope that the day is not far distant when we shall have at our disposal more than one way of effectually combating the tubercular bacillus,

C. Bollinger³⁴ considers that the frequency of infection through the skin has been underestimated. Several cases have been recorded of direct inoculation by wounds received from broken spittoons, etc., by bites, after circumcision, by morphia syringes, and ear-rings. Eczema and impetigo increase the susceptibility of the skin. No case has as yet been attributed to vaccination, and it would appear that the tubercle bacilli are unable to live in the vaccine lymph. They also appear unable to pierce the pores of the skin, as do some of the pyogenic organisms. The susceptibility of the mucous membranes is increased by inflammatory processes, such as otitis, rhinitis, conjunctivitis, pharyngitis, etc.; from thence the poison travels to the submaxillary glands and those of the neck, and generally causes local tuberculosis of the glands. The chief point of infection is, of course, the lungs. Local predisposition is best exhibited by apices which have been before diseased, but have undergone a healing process. The movement is deficient both in expiration and inspiration, and the liability to re-infection is increased by anæmia; irritants, such as coal and metallic dust; constitutional influences, such as diabetes, disturbances of digestion, and unhealthy surroundings. The poison may pass through the lungs and attack the bronchial glands, under which circumstances the disease may be very insidious. As regards the infection from milk, this is, in Bollinger's opinion, undoubtedly due to the udder of the cow being affected with the disease. Infection through the milk of tuberculous women has not yet been proved. In tabular form the organs of the body are thus affected, beginning with those most frequently diseased: (1) lungs; (2) the lymphatic glands; (3) intestines; (4) serous membranes; (5) larynx; (6) spleen; (7) joints; (8) bones; (9) liver; (10) kidneys; (11) the genital tract; (12) the skin; (13) brain and spinal cord; (14) muscles.

Detection of Bacilli.—Fraenkel⁴¹ uses in the detection of bacilli the Biedert deposit method, which has never yet failed to disclose them; he thinks failure has attended all other modes of study. This method consists in adding to a tablespoonful of the sputum 2 or 3 tablespoonfuls of water and a drop or two of liquor sodæ. This mass is now heated, boiled, and, after boiling, is then additionally diluted with 5 or 6 tablespoonfuls of water. The fluid is now poured into a conical glass and allowed to stand two

days. One or 2 centimetres (16 or 32 minims) of the deposit which thus forms is decanted and examined in the usual way, preferably with the staining process of Gebbet, which is a combination of the Ziehl and Neilson methods. The deposit has never yet failed to show bacilli by the dozen, even though the same staining process had hitherto failed to find a single specimen.

Vincent ⁸⁰⁰_{Nov. 16} illustrates by the following plates the destructive action of leucocytes. In the upper half of the first drawing are bacilli, highly magnified; in the lower half, the same bacilli in sputum, with deformed leucocytes and epithelial *débris*. In the second are macrophagi and microphagi filled with bacilli, and in the third giant-cells, likewise filled.



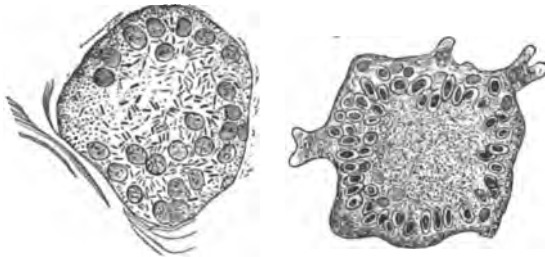
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Grawitz ⁸⁴_{Aug. 9} describes the primary seat of the bacilli as follows: (1) air-passages, 152 cases; (2) alimentary canal, 9 cases; (3) external organs, 3 cases; (4) other organs, 33 cases: in all, 197 cases. In 24 autopsies the primary seat could not be established, as the chronic course of the disease had disseminated it widely.

Miscellaneous.—Ormerod, ²²_{Sept. 10} writing on quiescent phthisis, shows that, of 100 cases of fatal phthisis taken at random (all over 20), 30 showed, on autopsy, chronic renal disease (18 granular).

Foxwell ¹⁵¹_{Apr.} reports a case of tuberculosis, with rupture of a caseous nodule into the pericardium, detected on autopsy. Wood ⁶_{Aug. 1} reports a case of hyoid dislocation during cough.

Levison, of Copenhagen, corresponding editor, states that, to test the theory advanced by Bidder and supported by Treined, that infection with the virus of tuberculosis was favored by a modification of the blood, in which it is thought to contain an excess of potassium salts and a deficiency of sodium than ordinarily, Israel³⁷¹_{v. 21, No. 14} has made a series of experiments. He put rabbits, which are predisposed to tuberculosis, on a *régime* of



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“sodium salts,” and white rats, ordinarily very refractory to the disease, on a *régime* of “potassium salts.” The treatment was continued for more than six months, and also on the young brought forth during this time. Finally, all the animals were in-



BACILLUS OF TUBERCULOSIS.
(*Revue générale des sciences pures et appliquées.*)

oculated with tuberculous matter. The rabbits were as susceptible, the rats as refractory, to the disease as before.

Kiernan³⁸_{July} describes the mental symptoms of phthisis as illustrated by Keats and Emily Brontë. The author speaks of the well-known *spes phthisica*, and quotes from Schroeder von der Kolk, who observed the relation between phthisis and insanity. Keats was irritable, querulous, and suspicious, as was his brother,

who also died of the disease; and the author ascribes Keats's disease to persecution because he was "an apothecary's assistant," as he was insultingly dubbed. This statement might pass for Shelley, who says that Keats was driven by the *Quarterly Critique* into a state bordering on insanity, which produced the first hæmoptysis; but would hardly be accepted by the physician of modern education, who reads that Keats faithfully nursed his older brother, Tom, who died of the disease, as did also his younger brother. The author speaks with derision of "the prevalence of fiction in medical thought," as illustrated in the maintenance of the theory at Rome of the contagiousness of phthisis, so that "the room in which Keats died was treated as if an infected person had died therein." So, too, the author quotes from Miss Robin, regarding Emily Brontë, that "insanity and genius stand on either side of consumption, its worse and better angels." "Let none call it impious or absurd," the author continues, "to rank the greatest gift to mankind as the occasional result of an inherited tendency to tubercular disease," and so on. Miss Brontë's father seems to have been deranged, but the mother had a "consumptive constitution" (quotation marks ours). Fortunately, the study of tuberculosis has passed out of metaphysics into physics.

The remaining contributions of the year do not present features of sufficient interest to warrant mention here, save as regards the erection of special hospitals and fresh-air treatment, both of which may be necessary or factors in the treatment of the disease. Bumm⁴¹_{Sept. 12.25, Oct. 1} details existing knowledge concerning the question of tuberculosis from the stand-points of etiology and prophylaxis, closing with the comforting words of Cornet, that, "with proper care as to cleanliness, the phthisical patient is innocent even to his immediate surroundings."

Treatment—Hot Air.—Krull⁴_{Oct. 27} still advocates the virtues of hot air. Schoengut and Pfeffer¹⁶⁹_{Sept.} conclude that, while hot air does check night-sweats, the general innocuousness of the method is counterbalanced by its evil effects upon a diseased larynx.

Cary¹⁵⁷_{Apr.} concludes that the factor productive of the benefit arising from the Weigert method is the dryness rather than the heat of the inspired air.

Gilbert's observations¹⁹⁷_{Nov. 1} are in accord with those published by Weigert, Kohlschuetter, Bowie, de Renzi, and others. Mikhail G.

Byvalkelvitch, of Vilna, ⁵⁸⁶_{No. 9, 10} also speaks favorably of the treatment and details 8 cases, in all of which he happened to observe a marked relief of breathing, disappearance of night-sweats, alleviation of the expectoration, decrease of pain about the chest. In a majority of his patients the appetite improved and the body's weight slightly increased, while in one case "laryngeal tubercular ulcers showed a considerable amelioration in a week." On the other hand, Demme, Dujardin-Beaumetz, Seibert, Rosenfeld, Trudeau, Moeser, Ugolino Mosso, Alippio Rondelli, and di Vesta write more or less unfavorably of the hot-air method. A. P. Korkünoff, of St. Petersburg, ⁵⁸⁶_{No. 41, 42} communicates his 6 cases, which justify the conclusion that, "most decidedly, Weigert's method does not manifest the slightest retarding influence on the course of pulmonary or even faucial and laryngeal tuberculosis." On the contrary, "intensified respiratory efforts required from the patient by the inhalations give rise to a very rapid prostration and accelerate the development of the pulmonary process." A. Chelmowski, of Warsaw, ⁵⁸⁶_{No. 38} who had tried the method in 6 cases, similarly arrived at the conclusion that "the inhalations are not only useless, but positively detrimental." In all his cases the patient's general nutrition grew considerably worse, his strength decreased, the body's weight began to fall far more rapidly, etc.

Sehrwald ⁶⁰_{No. 16}; ²⁵_{Oct.} shows that any notable elevation of the pulmonary-tissue temperature is neither obtained by inhalations of hot dry air nor by the direct penetration of heated air into the trachea. Gilman Thompson ⁵⁹_{Apr. 28} calls attention to the fallacy of the so-called hot-air treatment.

Hydrofluoric Acid.—Garcin ²⁴_{Aug. 21} still advocates hydrofluoric acid, not as a specific or panacea, but as a precious means of treatment.

Creasote.—Sommerbrodt ⁶¹_{Mar. 1} reiterates his claims for the creasote treatment of phthisis introduced by him. He maintains the assertion, made in his first publications, that the initial stage of the disease can be cured by creasote, while in the later stages the patient can be greatly relieved by the treatment, as has been proved by his own experience and that of many others. A positive explanation of the favorable action of creasote has, of course, not been given. Cornet's experiments on guinea-pigs likewise furnish explanation of the favorable action of creasote; they show its lack

of influence in the infection of these animals with tubercle bacilli; so that, according to him, the favorable influence of creasote upon phthisis is to be ascribed to its action in improving the appetite and in diminishing the secretion of the bronchial mucous membrane. Sommerbrodt, however, has observed such an extremely favorable action upon the bacilli and the morbid processes in the lungs in the human subject that he is not satisfied with Cornet's negative experiments upon guinea-pigs. He prescribes the remedy in capsules of 0.05 gramme ($\frac{1}{4}$ grain) with balsam of tolu, giving in all as much as 1 gramme (15 grains) per diem.

De la Croix, Kernig, and Masing²¹_{Sept. 1} cite cases showing the virtues of creasote. Assmuth²¹_{Sept. 1} found that, so far from producing albuminuria, it had cured this condition in pyelitis. Nickles⁵³_{May 28} advocates moderate doses, 5 to 10 minims (0.32 to 0.65 gramme), daily, over a long time.

Foy²²_{Sept. 10} uses the following formula:—

R Creasoti, 3j (4.0 grammes).
Glycerini, ad 3iij (98.0 grammes).
Ft. mist.

Take half a teaspoonful after meals and at bed-time, with a half to a teaspoonful of whisky and 2 ounces of water.

The results given from the treatment are most satisfactory, patients showing a marked increase in weight and a return of their normal strength. The difficulty of securing good beech-wood creasote might be met, he thinks, by the use of guaiacol, which exists to the extent of 60 per cent. in good creasote, and of the therapeutic value as a substitute for the crude drug he can speak most favorably.

Pepper¹⁹_{Nov. 20} prescribes:—

R Creasote, 82 drops.
Comp. tincture of gentian, . . . 1 fl. ounce (81.0 grammes).
Comp. tincture of nux vomica, . . 2 fl. drachms (8.0 grammes).
Whisky or brandy, 2 fl. ounces (62.0 grammes).
Glycerin, 1 fl. ounce (31.0 grammes).
Sherry wine, 1 pint (500.0 grammes).

M. Sig.: A dessertspoonful to two tablespoonfuls.

Diamantberger¹⁰⁰_{Nov. 20} uses creasote and guaiacol by subcutaneous injection. Sahli²¹⁴_{Aug. 18} reports on the benzoate of guaiacol and the reason of the good effects of creasote and guaiacol in phthisis, which he attributes entirely to its effect upon the stomach. Picot³⁶³_{Feb. 9} lauds the use of guaiacol iodoform.

French⁹_{Nov. 20} reports a death by pneumothorax after four injections of 10 minims (0.65 gramme) of 3-per-cent. creasote in oil of sweet almonds. Rosenbaum⁸⁸³_{Nov. 19},¹¹_{Sept.} highly recommends frequent inhalations of a mixture of 1 part of menthol, 3 parts of eucalyptus oil, and 2 of oil of peppermint. When at home, the sufferer should pour several drops of the mixture on the surface of hot water; when out, the mixture (3 to 4 drops) should be inhaled from a handkerchief. The treatment is said to be rapidly followed by a marked decrease of expectoration, alleviation of cough, and amelioration of the patient's general state.

Naunotte⁵⁷_{Nov. 16} maintains that the balsam known as the *essentia giroflæ* is the most destructive agent we possess against the tubercle bacillus. He injects it subcutaneously in a 10-per-cent. emulsion with olive-oil. It is better than iodoform for abscesses, though of little value in bone and joint affections.

Chabannes recommends inhalations of CO₂ in the relief of dyspnoea. At Vals the CO₂ is given off from the earth and is distributed at pleasure by tubes and taps. Neusser⁹⁰_{Oct.} advises potassium tellurate in relief of night-sweats. He gave it in doses of 0.02 to 0.04 gramme ($\frac{2}{7}$ to $\frac{3}{8}$ grain), in pill, to phthisical patients. No alteration in the progress of the disease was noticed, but the night-sweats were in a great many cases either stopped or materially lessened. After a week toleration became established and the doses had to be increased. Toxic symptoms, chiefly gastric dyspepsia, etc., occurred only after daily dose of 0.06 gramme ($\frac{9}{16}$ grain). In all cases there was an odor of garlic in the breath.

Gibbes and Shirley⁵_{July} consider the hyposulphite of calcium as of decided benefit in chronic cases. Their work in this direction is very praiseworthy and will be elaborated upon in the next issue. Pick²²_{Sept. 1} advocates the insufflation of depurated coal-dust (*fuligo depurata*) for beginning cases.

Tellurate of Potassium.—This drug has been found by Neusser⁸¹_{Oct. 21} to be valuable in the suppression and diminution of night-sweats. He employs $\frac{1}{2}$ grain in pill form. After the patients have taken this dose for a short time, it may be doubled without unfavorable results and with a good effect in reducing the quantity of sweat, provided the first dose has not been sufficient to control it. In rare cases the drug may produce dyspeptic symptoms. As a general rule, however, it has a favorable effect.

Camphoric Acid.—Leu⁶⁷_{Mar.20} recommends camphoric acid in capsules for night-sweats of phthisis. In most cases treated the medium dose was 30 grains at night, often increased. The effect of the acid sometimes extended even to the succeeding night. To compare the acid with atropine, they were given alternately to 6 patients. Very large doses of atropine were used, but a complete effect was obtained in only 40 per cent. Atropine is thus less efficacious and far less lasting in action than camphoric acid. Moreover, atropine may cause difficulty in swallowing, dryness of the pharynx, great thirst, disturbed sleep, and vertigo. The acid does not in any way interfere with appetite or digestion.

Acetanilide.—According to the observations of A. Favrat,⁸_{Sept.17} on a large number of cases under the care of Sahli, of Berne, acetanilide, administered in doses of 0.05 to 0.10 gramme ($\frac{1}{4}$ to $1\frac{1}{2}$ grains) every hour or two, according to the susceptibility of the patient, or 0.20 to 2.0 grammes (3 to 30 grains) daily (0.50 to 0.80 gramme— $7\frac{1}{2}$ to 12 grains—being the usual amount), gives great subjective relief to the patient in the hectic fever of tuberculosis and effects a marked and persistent decline in the temperature, without the inconveniences and dangers of the same medication taken in larger doses at longer intervals (collapse, cyanosis, chilliness, profuse sweats). The antipyretic effect is, moreover, most marked when the fever is very intense. After a dose of 5 to 10 centigrammes ($\frac{3}{4}$ to $1\frac{1}{2}$ grains), the temperature declines generally 1° C. (1.8° F.), sometimes even 2° C. (3.6° F.), and this lowered temperature may be maintained by the subsequent doses of the remedy. The use of acetanilide, however prolonged, does not produce any unpleasant effects. In infants the dose need not exceed 1 or 2 centigrammes ($\frac{1}{4}$ to $\frac{1}{2}$ grain).

Inhalations.—Engel,⁹⁰_{Sept.25} reviews the medicaments by inhalation recommended in the last decade, reaching the conclusion that there is no hope of destroying the bacilli in this way.

Antiseptic intra-pulmonary injections were employed by Vigneron^{1042;26}_{May} amongst the patients admitted under Spillman, in 14 cases. The injections were made with solutions of iodoform, creasote, and thymol, in 90-per-cent. alcohol. The favorable results recorded by several experimenters have not been confirmed by Vigneron, who, instead of finding that benefit has been derived, states that the results of this method of treatment have been disastrous.

The work done by Vigneron, with complete sincerity and frankness, has the advantage of giving a note of warning to those physicians who may be tempted to try intra-pulmonary injections. It is useful to science, however ungrateful it may appear, to point out what not to do. Grauche⁶_{Aug.16} found nothing so good as boric acid. Ladendorf⁴¹_{Nov.17} reports on arsenic injections. He allays pain by previous injections of cocaine.

Roussel⁶_{Nov.16} injects perfumes such as jasmine, heliotrope, etc. In 1886 Benjamin Ball made experiments at the Laennec Hospital for Incurables, carrying out Roussel's system. Out of 21 patients, 10 were able, after treatment, to leave the Hospital for Incurables and resume their work, 5 were still under treatment at the time these facts were reported by Ball to the French Academy of Medicine, and 6 had died. Ball stated, in his report to the Academy of Medicine, that the hypodermatic injections had a marked effect on the "septic" symptoms of phthisis, namely, that there was a cessation of night-sweats, of diarrhœa, a reduction of the expectoration and the fever, together with improved appetite. Ball could not affirm that a cure had been found for phthisis, as the experiments had not been made on a sufficiently extensive scale; but evidently there was good ground for hope. Pio Marfori⁵⁸⁹_{Sept.27} claims to have obtained good results in some cases of phthisis by making the patients inhale chloroform for a few minutes six times a day. The cough is relieved, the character of the secretion modified, and the febrile temperature reduced. The symptoms return when the treatment is suspended. Marfori gives one illustrative case, that of a young man with advanced disease of one apex and greatly reduced by two years of illness, who was "perfectly cured" by chloroform inhalations in three months. During that period he had taken, or at any rate used, 5 kilogrammes (160 ounces) of chloroform. Potter⁷⁷_{Oct.} states that he will try vapor of chloroform systematically as a bacillicide.

Picot¹⁴_{Nov.18} injects sterilized olive-oil and vaseline containing guaiacol and iodoform—0.01 iodoform and 0.05 guaiacol to the cubic centimetre. The author reports 15 cases treated "with good results." The treatment was especially valuable in pleurisy. Large effusions disappeared in ten to twelve days.

Tyndale¹_{Nov.20} reports 6 cases, all much benefited by the inoculation of vaccine virus.

Surgical Treatment.—Tillmans, of Leipzig,²⁵⁷ recommends that in severe, one-sided cases the seat of disease should be exposed sufficiently for local surgical treatment by free resection of the chest-wall in front or behind. In suitable cases the performance of a temporary resection of the chest-wall may be recommended. A pedunculated flap of skin and bone is formed and turned back, and afterward, when the disease of the pleura and lung is cured, the thoracic coverings are replaced in their original position. One can also proceed in such a manner that, after extensive resection of the ribs, the soft parts in the chest are divided in the direction of the lung, the flaps of soft tissues drawn apart with wound-hooks, the pleura and lung subjected to adequate local treatment, and then the soft tissue-flaps united to the pleura by compression. In his above-related case he was obliged to remove the anterior part of the left chest-wall *in toto*, as it also was extensively diseased. In the case related there was a perfect cure, the man being after two years quite well and able to attend to his business as a merchant as before.

Schäfer³⁴ ¹⁴⁷_{July 8; Nov.} reports a case caused by facial erysipelas. Grauche,²² ^{Aug. 27} and Martin continue their studies with vaccination methods. The method employed was the injection of tuberculous cultures attenuated in various degrees, and used like the dried spinal marrow in Pasteur's treatment of rabies and hydrophobia. Nine degrees of attenuation have been obtained, the four last being such that the cultivations remained sterile. The injections were made first with the most attenuated cultivations, and then with more and more virulent ones. The authors consider that by this method they have succeeded, on the one hand, in conferring on rabbits prolonged resisting power against the most certain and the most rapid experimental tuberculosis, and, on the other hand, in conferring an immunity against that disease, the duration of which remains to be determined.

Summary of Treatment by Drugs, etc.—In a paper read before a medical society of St. Petersburg, Schmidt,⁶¹ ^{June 14} describes all the modern methods employed in the treatment of tuberculosis, including Weigert's inhalation of hot air. He concludes that nearly all these remedies are inefficacious because they cannot be applied in sufficient strength without injury to the patient, or because they fail to penetrate the tissues sufficiently to reach the

bacilli. It remains for phthisical subjects, then, to content themselves with caring for their health by means of the inhalation of relatively pure air, free from dust, by good strengthening nourishment, and by strict attention to the hygiene of the body.

Uspenski ⁵⁷¹_{No. 44} reports on the vivifying effects of Brown-Séquard's injection treatment of 2 acute and 12 chronic cases of phthisis, not by the destruction of the bacilli, which never entirely disappeared, but by attenuation of their pathogenic effects. Dixon ¹⁹_{Oct. 19, Jan. 17, '91} used on animals metabolic products of the tubercle bacilli obtained from culture-soils after filtration by the action of ether and common salt, with results similar to those obtained by Koch. Special hospitals for consumptives are advocated by Osler and Griffith, ⁵_{June} by Cornet and Gerhard, ⁴¹_{Mar. 2} in editorials, ⁹_{June 21}; ⁸⁴_{Apr. 5, 18} by de la Croix, ²¹_{Feb. 24} Driver, ⁴¹_{May 12} Flick, ⁷⁸⁰_{Mar. 15} editorial, ¹²³_{Feb. 15} Spinola, ⁴¹_{June 22} Finkelnburg, ⁴¹_{June 28} Hiller, of Breslau, ⁶⁹_{Oct. 9} advocates the erection of hospitals on the North Sea Islands, especially the island Föhr, for the reception of the crowds of patients in the large cities. Nicaise ⁶⁷_{Oct. 20} advocates the establishment of sanatoria for the phthisical.

Herman Weber ⁸⁴_{Aug. 26} advocates the special hospital because (1) it alleviates the lot of a poor patient; (2) because it improves the condition of the family; (3) that a certain number of patients are so far cured as to be able to resume work; (4) that patients here learn better modes of life and how better to protect themselves from relapses, especially (5) how to dispose of the sputum, so that (6) the disease in general is limited in its spread.

At the meeting of the Tenth International Congress, August 5, 1890, ⁶⁹_{Sept. 6} Leyden said that undoubtedly the best treatment of consumptives could be carried out only in institutions of this kind, and, even if the hopes of Koch as to the ultimate curability of tuberculosis should be fully realized, such sanatoria would still be necessary, at least for a long time to come.

Detweiler, of Falkenstein, was rejoiced to hear such plain words in favor of the hospital treatment of phthisis, and it might be said that the controversy concerning the utility of institutions of this sort was now closed, for the good results following their establishment were too evident to bear contradiction.

Paul Kretzschmar, of Brooklyn, described the Adirondack sanatorium and other similar institutions in the United States.

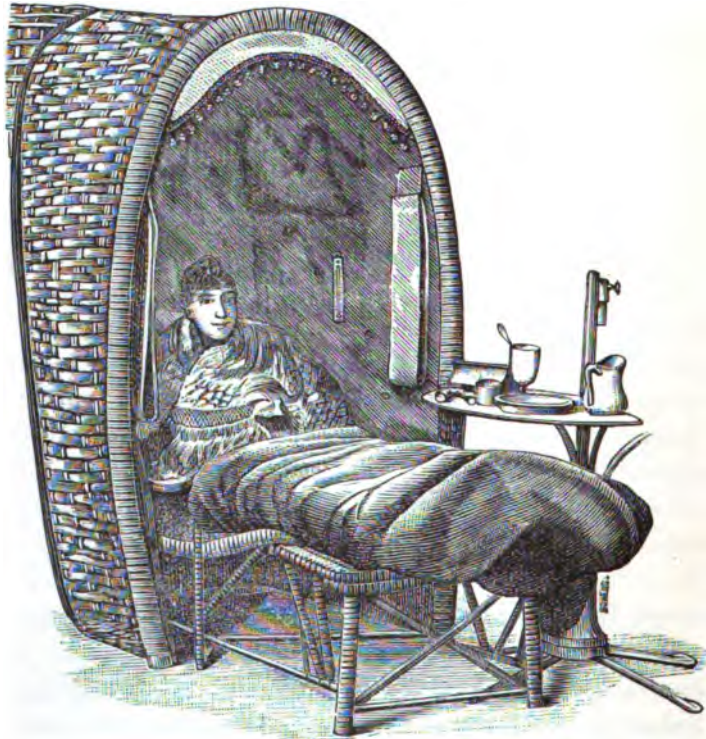
Cantani, of Naples, said that he had long noticed the fact that

rabbits inoculated with tuberculosis would resist the disease for a considerable time if they were well fed and placed where they could get plenty of fresh air and sunlight. He had also noticed that carnivorous animals resisted much better the action of the tuberculous virus than the herbivora. In the food of carnivora sodium salts predominate, while in that of herbivora there are more potassium compounds. This furnished a hint of some value in the therapeutics of consumption. In Italy there had for more than a century been institutions for the reception of consumptives, but these were rather places of refuge than hospitals. There had always been a popular belief in the contagiousness of phthisis, and for this reason the unfortunate without a home of his own could seldom find a place, and it, therefore, became necessary to establish institutions to harbor such patients. The existing refuges were, however, unsanitary to the last degree, and were little more than places to die in.

Trier, of Copenhagen, spoke of the hospitals for consumptives in Denmark.

Open-Air Treatment.—Daremborg ²⁹⁰_{Sept. 10} is a warm advocate of the open-air treatment, with bodily rest. The same author ⁶_{June 14} declares that, of the number of phthisical people who followed out this method, the great majority derived marked benefit. First of all, the fever was found to diminish, which indicated an arrest of the threatened general infection of the body and a lessened activity in the parts already invaded. As a consequence, better nights were passed, the appetite improved, the respiratory movements became more ample and the cough much less frequent. At the same time that this treatment by abundance of fresh air is being prescribed, it is necessary to forbid all fatigue, even short walks, should the temperature be over 38° C. (100.4° F.). There is nothing, however, in the method which contra-indicates the use of therapeutic agents and the usual methods of treatment in ordinary use when judged desirable. Patients are found to support the treatment best when lying down in bed rather than when up and sitting, and in this way the treatment may be begun by at first opening the bed-room window in the morning as soon as the temperature of the air reaches 8° C. (46.3° F.). After a time it will be found that the night air can, with certain preliminary precautions, be supported and respired with advantage. When gradually

habituated to this state of things, it was found that the sufferers bore well the atmospheric disturbances which usually cause so much distress to phthisical people who live a sheltered existence. The attacks of hæmoptysis and congestion so frequently observed under these latter conditions are much more rare. It must not be overlooked, however, that the almost absolute rest, or at least anything approaching the smallest overexertion or fatigue, plays an



BASKET COVE IN DAREMBERG'S OPEN-AIR TREATMENT OF TUBERCULOSIS.
(*Bulletin général de Thérapeutique.*)

important part in the results obtained; for, without doubt, exertion and fatigue are, next to the actual tubercle, the greatest enemies of the phthisical. In short, Daremberg concluded that rest in the open air constituted the most rational method whereby the patient could husband his strength and resources. The results were remarkable even in those suffering from high fever and undergoing hectic emaciation, and in his opinion the method ought to become the adjuvant of all therapeutical treatment. At the

same sitting Dujardin-Beaumetz condemned as useless the hot-air method advocated by Weigert.

In one of the German health resorts²⁷¹ the experiment was tried this summer of having the patient with pulmonary disorders sleep all night in the open air in the pine-woods. The hammocks used to rest in during the day were provided with pillows and bed-clothing, and a party of five, two ladies and three gentlemen, spent their nights in the woods, with no roof over their heads. The experiment was very successful; the patients slept better than they had been able to do in their rooms, and all declared themselves as feeling much more refreshed by their sleep than usual. It is proposed next summer to provide accommodation for a large number of patients in the forest, so that the experiment may be tried on a large scale.

The following extract²⁶ sums up the advantages of this method: "When improvement has set in, a little idle sauntering about may be permitted, but the patient must be *cured* before long walks or mountain-climbing is attempted. But he or she need not be quite idle. There is a course of pulmonary gymnastics to be practiced after a time,—rhythmical movements of the arms to strengthen the semi-atrophied muscles of the chest and expand the air-cells; passive at first, then gradually more active, but ever stopping short of fatigue. Then there are rubbings of the thorax to be regularly performed by the attendant, with alcohol, turpentine, or oil; sometimes douching the chest with cold water just after rising from bed, carefully adjusting the temperature so that satisfactory reaction may set in. The diet must be liberal,—plenty of meat, cream, and butter; milk in moderation, for, if too much be given, the appetite for the far more important meat is diminished. Alcohol is always borne well in phthisis, and generally does good; only it must be withheld when there is a tendency to hæmoptysis or gout. To a patient in easy circumstances one need not fear now to pronounce the once hopeless diagnosis,—consumption. Only, in order to be cured, every occupation, every thought, and all anxiety must be given up; the patients must display the same resignation in being rescued from death as they were of old expected to show in preparing for it."

Up to January 1, 1891, the articles written on the treatment proposed by Koch were necessarily limited. For the benefit of

our readers we present the following list of the publications on the subject up to April 1, 1891:—

- R. Koch, Berlin ¹¹⁴⁵_{No.44} ⁶⁹_{No.2} ¹⁶⁹_{No.2} ⁴¹_{No.2} ²⁰⁵_{No.2} ⁶⁹_{No.2} ¹¹³_{No.2}; Jarisch and Pommer, Innsbruck ⁵⁷_{Dec.14}; F. Winnett ²⁵⁷_{p.101}; H. Campbell ²_{p.1066}; A. H. Carter, Birmingham ²_{Dec.27} ¹⁰⁷_{Mar.15, '91}; S. Bernheim, Nancy ³⁶³_{p.49}; Demuth ⁸⁸³_{p.271}; Luigi Devoto, Naples ⁵⁶⁹_{No.1}; H. Dippe ¹³_{p.27, '91}; Diday, Lyons ²¹¹_{Dec.}; Thorwald Eibe ³⁷⁸_{No.44}; Emmerich and Buchner ⁶⁵⁰_{No.47}; P. Fürbringer ⁶⁹_{No.22}; F. Hirschfeld, Berlin ⁴_{No.2}; J. Hofmeister ⁴_{No.53}; Kleinwächter ⁶⁹_{No.22}; A. Kronfeld ¹¹⁵⁸_{No.1}; Nothnagel and Billroth ⁶⁵⁰_{No.47}; P. K. Pel ⁵⁸³_{p.2, '91}; Rembold and Burkart ¹²³_{No.22}; G. Rosenfeld ⁶⁹_{No.22}; J. A. Ross ⁶_{p.1229}; J. Schlesinger ⁶⁵⁰_{No.1, '91}; H. Sievers ⁴⁹⁸_{p.777}; W. Beely Thorne ⁶_{p.1247}; A. Wieger ¹¹⁵⁹_{'91}; T. Weber, Halle ⁸⁴_{No.50} ⁶⁹_{Jan.22, '91}; Sante Duse and Pietro Rini ⁶¹⁶_{No.50, 51}; L. Rydygier, Cracow ⁸_{Dec.11}; H. Senator, Berlin ⁴_{Dec.10} ⁶⁵⁰_{p.808} ³⁴¹_{p.755}; Ed. Henoch, Berlin ⁴_{Dec.10}; Litten, Berlin ⁴_{Dec.10}; K. Turban, Davos ⁴_{Dec.10}; C. A. Ewald ⁴_{Dec.10}; Padro Almeida, Catalana ⁴⁹⁴_{Dec.7} ⁶⁹_{Dec.15} ^{Dec.21; Wm. H. Bennett, Philadelphia ⁹_{Dec.20}; von Ziemssen, Munich ³⁴_{Dec.16}; Diamantberger, Paris ¹⁰⁰_{Dec.16}; M. A. Weill, Paris ¹⁰⁰_{Dec.16}; Grünwald, Munich ³⁴_{Dec.2}; J. Toison, Lille ²²⁰_{Dec.13}; Du-jardin-Beaumetz and Ley, Paris ⁶⁷_{Dec.15}; W. G. Macdonald, Albany ²¹⁶_{Dec.}; Morales Pérez, Catalana ⁴⁹⁴_{Dec.15}; F. A. Simmons, St. Joseph, Mo. ⁸⁵⁸_{Dec.}; Karl Maydl, Vienna ⁵⁷_{Dec.14}; H. H. A. Beach, Boston ²_{Jan.4, '91}; C. W. Cram, Burlington, Iowa ¹⁸⁹_{Jan., Feb., '91}; Hutchinson, London ⁸⁰⁶_{Jan., '91} ²_{Jan.21}; Carl von Ruck, Asheville, N. C. ⁸²_{Jan.21, '91} ⁸⁰_{Feb.16, '91} ¹²_{Feb., '91} ⁶¹_{Mar.26, '91}; J. W. Stickler, Orange, N. J. ¹_{Jan.24, '91}; E. J. Beall, Fort Worth, Texas ¹¹⁰_{Jan., '91}; L. B. Anderson, Norfolk, Va. ¹⁹⁶_{Jan., '91}; Otto E. Forster, St. Louis ⁸²_{Jan.17, '91}; E. C. Wendt, New York ⁹_{Jan.4, '91}; E. Berdoe, London ¹¹⁵²_{p.914}; Audain and Sauvinaeu, Paris ¹⁰⁰_{p.1274}; Dengel ⁴_{p.1099} ⁶⁵⁰_{No.46} ¹¹⁶_{p.22, '91}; W. A. Meisels ⁶²²_{p.1129}; I. B. Yeo, London ²_{p.1274}; M. Bogoljouboff, Moscow ¹¹⁵⁸_{'91}; Max Birnbaum ¹¹⁵⁴_{'91}; Lennox Browne ¹¹⁵⁵_{'91}; J. Amann ⁵⁰_{p.1, '91}; M. Arnstein, Warsaw ⁵⁵¹_{p.26, '91}; R. O. Beard and J. C. Stewart ¹⁰⁵_{p.54, '91} ⁶⁵⁰_{p.29, '91}; F. Cohn ⁹¹⁹_{p.20, '91}; H. Davy ⁶_{p.298, '91}; Dubrueil ²⁹⁸_{p.25, '91}; T. S. Flatau ⁴_{p.54, '91}; W. Guttman ¹¹⁵⁶_{p.12, '91}; Grundke ⁷¹_{p.1, '91}; A. Oppenheim ⁴_{p.56, '91}; Korczynski ⁵⁶⁹_{p.28, '91}; Korczynski and Adamkiewicz ⁵⁶⁹_{p.18}; E. S. Perman ¹¹⁵⁷_{p.247}; L. V. Popoff ⁵⁷¹_{p.679}; E. Selander ³⁷⁰_{p.52, '91}; G. Thibierge ²⁴⁷_{Dec.25}; Meyer, Urban ⁶⁹_{Mar.12, '91}; E. J. Moure and Raulin, Charazac ¹²⁶_{Mar.15, '91}; H. Westphalen ²¹_{Mar.22, '91}; Cavallero ⁵⁰⁰_{No.4, '91}; Ribbert, Berlin ⁶⁹_{Nov.22}; R. Heinz, Breslau ⁴_{Dec.15}; Köhler, Berlin ⁴_{Dec.15}; Gustav Singer, Vienna ¹¹³_{No.20}; Haslund, Copenhagen ³⁷³_{Dec.17}; A. Hénocque ³⁵_{Dec.17}; Uckermann ³⁶⁹_{No.12}; R. W. Philip ²_{Dec.13}; Wm. Hunter, Berlin ²_{Dec.13}; Bossi, Turin ⁹¹⁷_{Dec.22}; Chiari, Prague ⁸⁸_{No.22} ¹¹³_{Jan.11, 12, '91}; Bozzolo, Turin ⁹¹⁷_{Dec.22}; Uspenski ⁴¹_{Dec.26}; J. W. Achorn ⁶⁹_{p.64, '91}; W. Levy ⁶⁹_{p.1064}; S. G. Dixon ⁹_{p.54, '91}; Max Einhorn ¹⁵⁰_{p.1, '91}; Fer-}

rière¹⁹⁷_{p.725}; von Gossler⁶⁵⁰_{p.1185}; Kammerer⁸_{p.2261}; A. Léchopie⁵⁵_{p.614}; J. Prior, Munich³⁴_{Jan.27, Feb.2, 10, 17, '91}; de Giovanni, Padua⁵⁸⁹_{Jan.12, Mar.4, '91}; Malcolm Morris and J. J. Pringle, London⁶⁹⁷_{Jan.1, '91}; Immermann, Basel²¹⁴_{Jan.1, '91}; C. Theodore Williams, Brompton²_{Dec.30}; T. Shaefer and J. Wolf, Kansas City, Mo.⁷²; G. A. Heron, London⁶_{Dec.6}; Aug. Predöhl, Hamburg⁶⁹_{Dec.11, '91}; Helferich⁶⁹_{Dec.11}; Ed. Arning, Hamburg⁶⁹_{Dec.11}; L. Bremer, St. Louis, Mo.⁶⁵; Oscar Fraentzel, Berlin⁴_{Dec.3}¹¹³_{p.1929}; H. Krause, Berlin⁴_{Dec.3}¹¹⁶_{p.694}⁶⁰_{Mar.12, '91}; O. Rosenbach, Breslau⁶⁹_{Dec.4}⁶⁹_{Jan.2, 15, Feb.19, '91}; Oppenheimer, Heidelberg⁶⁹_{Dec.4}; Ernst Kromeyer, Halle⁶⁹_{Dec.4}⁶⁹_{Feb.19, '91}; Carl von Noorden, Berlin⁶⁹_{Dec.4}; Chas. Nelson Gwynne, Sheffield⁶⁹_{Dec.27}; Wilhelm Ebstein, Göttingen⁶⁹_{Dec.18}⁴_{p.1175}; H. Lindner, Berlin⁶⁹_{Dec.18}; A. Fraenkel, Berlin⁶⁹_{Dec.18}; Hermann Lenhartz, Leipzig⁶⁹_{Dec.18}; Czerny, Heidelberg⁶⁹_{Dec.18}; B. Stiller, Budapest⁶⁹⁶⁵⁰_{No.49}; O. Kahler, Vienna⁸_{Dec.4}^{32; C. Bayer, Prague⁸⁸_{Nov.24}; Henry S. Stearns¹_{Dec.27}; Malcolm Morris²_{Dec.12}; Joseph Lister²_{Dec.3}⁶_{Dec.6, 12}; C. R. Illingworth²²_{Dec.24}; Weichselbaum and Drasche⁸⁸⁸_{No.49}; von Jaksch⁸⁸_{No.49}¹¹³_{Nov.1, 2, '91}⁸_{Dec.7}⁸_{Dec.11}; Koritschoner, Vienna⁸_{Nov.27}⁸_{Dec.4}; Hertel, Berlin⁶⁹_{Nov.27}; Feilchenfeld¹¹⁶_{Nov.27}; Hueppe, Prague¹¹³_{Nov.20}; Nothnagel, Vienna⁵⁷_{Nov.20}; Schnitzler, Vienna⁵⁷_{Nov.20}⁶⁵⁰_{p.608}; v. Bergmann, Berlin⁵⁷_{Nov.20}²⁸³_{p.664}; H. Buchner, Munich³⁴_{Nov.25}; Frederic S. Eve⁶_{Nov.25}; H. Radcliffe Crocker, London⁶_{Nov.25}; Casse, Middelkerke⁵²_{p.761}⁷¹⁷_{Dec.27}; Lublinski, Berlin⁶⁹⁶⁹¹¹³_{p.1107}_{Nov.27}_{Dec.14}; Péan, Paris¹⁴_{Nov.30}¹⁰⁰_{p.141}; Cornil, Paris¹⁴_{Dec.10}⁵⁵_{No.50}⁸²⁷_{No.50}; Fräntzel and Runkwitz, Berlin⁶⁹_{No.27}; Köhler and Westphal, Berlin⁶⁹_{No.47}¹¹³_{Dec.21}; H. Frémy¹⁷⁵_{Dec.15}; E. Solles¹⁸⁸_{Dec.22}; James Robertson²⁸⁷_{Nov.15}; Hayoit⁵²_{Nov.15}; de Rechter, Brussels²⁸⁸_{Dec.7}; H. von Burckhardt¹³³_{Dec.18}; D. Gaspar Gordillo Lozano, Madrid¹¹⁴⁶_{No.24}; W. Watson Cheyne²_{Nov.25}; Gluzinski, Krakau⁸_{Dec.25}; O. Angerer, Munich³⁴_{Dec.9}; H. Föhr, Marbach¹³³_{Nov.22}¹³³_{Dec.28}; O. Israel, Berlin⁴_{Dec.1}¹¹⁶_{Jan.5, '91}⁵⁷_{p.627}; E. Leyden, Berlin⁴_{Dec.8}⁵⁰_{No.50}; Paul Guttman, Berlin⁴_{Dec.15}⁶⁹_{Jan.5, '91}⁵⁷_{Jan.29, '91}⁵⁸⁹_{Jan.4, '91}; A. Cantani⁵⁸⁹_{Dec.10}; E. Parcetti, Napoli⁵⁸⁹_{Dec.18}; A. Coriveaud, Bordeaux¹⁸⁸_{Dec.14}; F. Mercandino⁵⁸⁹_{Dec.16, 17}; Harold C. Ernst, Boston⁶⁹_{Jan.22, 29, '91}; Josephus Craft, Cleveland⁶¹_{Dec.27}; Paul Lucas-Championnière, Paris²¹²_{Dec.25}; V. Gilbert, Geneva¹⁹⁷_{Dec.30}; Ch. Talamon, Paris³¹_{Dec.11}; Bauer, Munich³⁴_{Dec.22}; B. Fränkel⁴_{Dec.29}²⁸³_{p.620}; Gerhardt, Berlin¹¹³_{Dec.7}; Heneage Gibbes, Ann Arbor⁶⁹_{Dec.25}; Loeffler, Greifswald⁵⁰_{Dec.2}; Rumpf, Marburg⁶⁹_{Jan.15, '91}; Babes and N. Kalendero, Bucharest⁶⁹_{Jan.15, '91}; Schumann, Godesburg⁶⁹_{Jan.15, '91}; P. Kaatzer, Bad Rehbürg⁶⁹_{Jan.15, '91}; R. Virchow, Berlin⁶⁹_{Jan.15, '91}⁵⁷_{Jan.15, '91}⁴_{Jan.15, '91}⁴_{p.69}_{Jan.15, '91}; Potain, Paris¹⁴_{Dec.24}; Hofmeier, Berlin⁴_{Dec.22}; R. Burkart, Berlin⁴_{Dec.22}; Schrötter, Vienna⁸_{Dec.18}; G. Riehl, Vienna⁸_{Dec.18}; von Landesberger, Stuttgart¹³³_{Jan.20, '91}; Schaal, Esslingen¹³³_{Jan.20, '91}; Merkel, Nuremberg³⁴_{Jan.12, '91}; Bardenheuer, Cologne⁶⁹_{Jan.29, '91}; Oskar Brieger, Breslau⁶⁹_{Jan.29, '91}; Alb. Neisser, Breslau⁶⁹_{Jan.29, '91}; Isaac,}

Berlin ⁴¹ Jan. 19, '91; Verneuil, Paris ¹⁴ Jan. 21, '91; ¹⁷ p. 105, '91; Masius, Liège ²⁹³ Dec.; Henri-
 jéan, Liège ²⁹⁸ Dec.; J. Quiralto ⁴⁹⁴ Dec. 21; Rodriguez Mendez ⁴⁹⁴ Dec. 21; Mariano
 Semmola, Naples ⁵⁷ Jan. 4, 11, 16, '91; Feb. 25, '91; Thiersch, Leipzig ⁵⁷ Jan. 11, '91; Mosler,
 Greifswald ⁵⁷ Jan. 11, '91; Lumnitzer, Budapest ⁶²² No. 59; M. and Ad. Jolles, Vi-
 enna ⁵⁷ Jan. 4, '91; H. Lambinon, Liège ²⁵⁶ Jan. 15, '91; Fr. Schultze, Bonn ⁶⁹ Jan. 4, '91; Son-
 nenburg, Berlin ⁶¹ Jan. 6, '91; ⁶⁹ Jan. 15, '91; E. Hahn, Berlin ⁶⁹ Jan. 4, '91; O. Leichtenstern,
 Cologne ⁶⁹ Jan. 4, '91; H. Schmid, Stettin ⁶⁹ Jan. 4, '91; Grasset, Montpellier ³ Jan. 21, '91; E.
 Schwimmer, Budapest ⁶⁹ Jan. 4, '91; ⁶²² p. 1, '91; A. Poncet, Lyons ²¹¹ Jan. 18, Feb. '91; F. J. Pick,
 Prague ⁸⁴ Jan. 17, '91; ⁸⁸ p. 585; Courmont and Dor ³⁰⁴ No. 44; Dec.; ²¹¹ Dec.; Erich Peiper, Greifs-
 wald ⁶⁹ Jan. 22, '91; E. Kurz, Florence ⁶⁹ Jan. 22, '91; von Esmarch, Kiel ⁶⁹ Jan. 15, 22, '91; R.
 Lenzmann, Driesburg ⁶⁹ Jan. 22, '91; Ch. Bäumlér, Freiburg ⁶⁹ Jan. 6, '91; Korach,
 Hamburg ⁶⁹ Jan. 5, '91; Alsberg, Hamburg ⁶⁹ Jan. 5, '91; J. Michael, Hamburg ⁶⁹ Jan. 5, '91;
 O. Königshofer and E. Maschke, Stuttgart ⁶⁹ Jan. 5, '91; J. Schreiber, Aus-
 sere-Meran ⁶⁹ Jan. 5, Feb. 19, '91; Deshayes, Rouen ²⁰⁸ Jan. 1, '91; Bellencontre, Rouen ²⁴ Jan. 4, '91;
 Baratoux, Bordeaux ²⁴ Jan. 4, '91; E. Moritz, St. Petersburg ²¹ Feb. 21, '91; H. Lah-
 mann, Dresden ⁵⁷ Feb. 22, '91; Guido Ancona, Venice ⁵⁸⁹ Feb. 19, '91; B. Naunyn,
 Strasburg ⁶⁹ Feb. 26, '91; O. Reigner, Breslau ⁶⁹ Feb. 26, '91; C. Hellner and F. Speyer,
 Friedrichshain ⁶⁹ Feb. 26, '91; Doutrelepont, Bonn ⁶⁹ Feb. 26, '91; Gessner ¹⁹⁰ Jan. 4, '91;
 Edmund Leser, Halle ³⁴ Feb. 26, '91; Ernest Laplace, Philadelphia ⁹ Feb. 14, '91; Spill-
 mann and Haushalter, Nancy ¹⁸⁴ Feb. 15, '91; Henry T. Brooks, Berlin ²¹⁶ Feb. 7, '91;
 Ernest Besnier, Paris ¹⁸⁴ Feb. 26, '91; Golgi, Pavia ⁵⁸⁹ Feb. 16, '91; Mazzucchelli,
 Pavia ⁵⁸⁹ Feb. 16, '91; Carlo Luraschi, Pavia ⁵⁸⁹ Feb. 16, '91; Ferrara, Pavia ⁵⁸⁹ Feb. 16, '91; Pietro
 Albertoni, Bologna ⁵⁸⁹ Feb. 12, '91; E. Maragliano, Genoa ⁵⁸⁹ Feb. 11, 12, '91; Bovet, Bou-
 gues ²⁴ Feb. 1, '91; Ganghofner and Bayer, Prague ⁶⁹ Feb. 19, '91; Cerné, Rouen ²⁰⁸ Feb. 16, '91;
 Jasiéwicz, Paris ²⁴ Feb. 15, '91; ⁵⁸⁹ Mar. 7, '91; A. Jarisch ⁸ No. 50; J. Goldschmidt ⁴ No. 2, '91;
 H. Leloir, Lille ⁴¹⁰ Jan. 4, '91; Alejandro, San Martin ² Jan. 10, '91; C. B. Keet-
 ley ⁹ Jan. 21, '91; Phineas S. Abraham and Swinford Edwards ⁹ Jan. 21, '91; Ed-
 ward F. Grün and Walter D. Severn, London ² Jan. 17, '91; Simon Baruch,
 New York ¹⁹¹ Jan. 4, '91; Francis P. Kinnicutt, New York ⁵⁹ Dec. 27; ⁹ p. 608; H. P.
 Loomis ⁵⁹ Dec. 20, 27; John Blake White, New York ⁵⁹ Dec. 27; Robert Saundby,
 R. M. Simon, and Gilbert Barling, Birmingham ³² Dec.; Mar. '91; Michael,
 Hamburg ¹¹ Jan. 4, '91; W. C. Philp, Edinburgh ¹¹ Jan. 4, '91; J. Gabrylowicz,
 Halila, Finland ⁸⁴ Jan. 24, 21, '91; L. Revilliod, Geneva ¹⁹⁷ Jan. 20, '91; Alexander
 Borgherini, Padua ⁸⁴ Jan. 21, '91; Carl Faber, Stuttgart ¹³³ Jan. 2, 15, '91; Cuffer ³⁵ Dec. 10;
 Ferrand ³⁵ Dec. 10; R. Ramsey Wright, Toronto ³⁹ Jan. 16, Feb. 16, Mar. 16, '91; Heineze ³⁵¹ Dec.;
 A. C. Abbott, Baltimore ⁷⁶⁴ Jan. 4, '91; Tansini, Modena ⁵⁸⁹ Jan. 14, '91; Eduardo Lice-
 aga, Mexico ¹⁷⁹ Nov. 2, 4, 5, 6, '91; G. Darling and Simon ³² Feb. 7, '91; Luigi Cantu,
 Pavia, ⁵⁸⁹ Mar. 2, '91; E. Pilatte, Berlin ⁴⁶ Feb. 22, '91; Szigeti, Gleichenburg ⁶²² Mar. 2, '91; Jose
 Maria Bofill ⁴⁹⁴ Jan. 21, Feb. 16, '91; Arthur Irsai, Budapest ⁵⁷ Feb. 1, 2, '91; Rindfleisch,

Wurzburg ⁶⁰_{Feb. 4, '91}; James Robertson, Melbourne ⁷³⁴_{Feb. 15, '91}; Saundby, Wade, Barling, and Simon, Birmingham ³²_{Feb. '91}; W. D. Smith ²³³_{Feb. '91}; Emile Muller, Strasburg ⁵⁵_{Feb. 1, '91}; ¹⁶⁸_{Mar. 1, '91}; Thomas Whiteside Hime ⁶_{Feb. 14, '91}; Lichtheim, Königsberg ⁶⁰_{Feb. 12, '91}; Schlichte, Biberach ¹³³_{Feb. 12, '91}; Pribram, Prague ⁵⁷_{Feb. 15, '91}; M. Buffet ²⁰³_{Feb. 1, '91}; A. H. Bampton ²²⁴_{Mar. 14, '91}; Edward Lawrie ²³⁹_{Mar. '91}; Morrison ⁷⁶⁴_{Mar. '91}; F. W. Farnham ¹²_{Mar. '91}; J. A. Sponagle ²⁵⁴_{Mar. '91}; Jordan Lloyd ²²_{Mar. 11, '91}; Fergusson and Dingnall, Banff ⁶_{Mar. 14, '91}; Lanne-longue, Paris ¹⁴_{Mar. 20, '91}; Toop, Saxony ¹²³_{Apr. '91}; Stricker, Berlin ⁶⁰_{Mar. 20, '91}; Paul Simon, Nancy ¹⁸⁴_{Mar. 15, '91}; Schmitt, Nancy ¹⁸⁴_{Mar. 15, '91}; Haushalter and Prautois ¹⁸⁴_{Mar. 15, '91}; Leo Krynski, Cracow ⁵⁶⁰_{Mar. 10, '91}; Seydel, Munich ⁸⁴_{Mar. 17, '91}; G. Oka, Tokio ⁶⁰_{Mar. 19, '91}; F. Wolff, Görbersdorf ⁶⁰_{Mar. 10, Mar. 19, '91}; Thorner, Berlin ⁶⁰_{Mar. 19, '91}; Assaky, Bucharest ²⁵⁹_{Feb. 15, '91}; G. Ajelloe and A. Solaro, Naples ⁵⁶⁰_{Mar. 11, '91}; Emil Burckhardt, Basel ²¹⁴_{Jan. '91}; F. Egger, Arosa ²¹⁴_{Jan. '91}; Masó Brá ⁴⁹⁴_{Mar. 15, '91}; Russo-Travali, Palermo ⁵⁶⁰_{Mar. 19, '91}; P. Haushalter ¹⁸⁴_{Mar. 1, '91}; Alessandro Randi, Padua ⁵⁶⁰_{Mar. 6, '91}; Stintzing, Jena ⁸⁴_{Mar. 10, '91}; F. Riegel, Giessen ⁶⁰_{Mar. 12, '91}; H. Braun, Königsberg ⁶⁰_{Mar. 12, '91}; R. von Jasinski, Warsaw ⁶⁰_{Mar. 12, '91}; ⁵²⁰_{p. 22, '91}; B. Graziadei ⁵⁰⁰_{Feb. 25, '91}; A. Borgherini ⁵⁰⁴_{Jan. 21, '91}

EMPHYEMA.

Chapin ⁵¹_{Jan. '91} calls attention to the fact that in children there is not so apt to be a bulging in the intercostal spaces on the diseased side; the lung being so soft and compressible, offers the point of least resistance to the pressure of the fluid. Bewley ¹⁶_{Aug. '91} considers this disease due to the entrance of pus into the pleural sac, this producing micro-organisms. He thinks these organisms belong to several varieties and that they reach the pleural sac by different routes. He described five varieties of empyema: 1. Those cases in which ordinary pyogenic micrococci made their way into the pleural sac through an opening in the chest-walls or from the lung by the bursting of a pulmonary abscess or gangrene into the pleural cavity. 2. Those cases occurring in connection with croupous pneumonia, and caused by pneumococci. 3. Those occurring in persons afflicted with phthisis and which are tubercular. 4. Those cases in which, under various circumstances, pyogenic micrococci are able to enter and live for some time in the tissues of the body without doing harm. 5. Those cases which are a part of a general pyæmia.

The etiology of empyema in children is very carefully studied by Koplick. ⁵¹_{Oct. '91} In his investigations he adhered closely to the

methods employed by the Koch school. Careful bacteriological investigations were made in 12 cases of empyema, the cases being divided into four groups: 1. Those in which the bacterioscopic results are not uniform and the micro-organisms found not diagnostic. 2. Those in which he was not able to establish the presence of the pneumococcus of Fraenkel and Weichselbaum in the purulent exudate. 3. Empyema occurring in tubercular subjects. 4. Those cases in which a focus of suppuration situated outside the chest can be pointed to with a degree of probability as the possible source of infection. His investigations lead him to the conclusion that a large proportion of empyemas in children follow or complicate processes in the lung of an acute character. With early and efficient treatment these cases can be met cheerfully. Even those whose etiology is uncertain do not hold out such a bad prognosis to the patient. The tubercular and the pyæmic cases are the stumbling-blocks of pediatric practice.

The wonderful increase during the past year of empyemas is attributed in an editorial⁶¹ to influenza, which was the primary disease in many cases. The origin of these empyemas is given as: general infection of the blood, with influenza and consequent saturation of its germicidal quality; invasion of portions of the lung with pneumonia, producing parasites and consequent interruption of the lymph-currents from the pulmonary pleura over the affected area, resulting in serous pleuritic effusion; invasion of the lymph-spaces in the pneumonic area by pus-producing bacteria, which advance from the larger to the smaller bronchioles and to the lymphatics. These are then carried in the lymph in its abnormal course into the pleural cavity; here the bacteria multiply in the effused serum until the pleural surfaces are so modified by the products of bacterial growth that absorption is arrested and these surfaces become one continuous pyogenic membrane.

The pathology of empyema is the subject of an able paper by Bewley,¹⁶_{Nov. 1} who concludes that the disease is always caused by micro-organisms, but that they are of different species—not of one specific variety. Occasionally ordinary pus-producing and putrefactive bacteria get into the pleural cavity through some opening into the chest-wall or lung. Some cases are associated with croupous pneumonia, and are caused by the pneumococcus. Some are

due to the action of the tubercle bacillus; others are pyæmic. In some cases pus-producing micrococci, which have, in some way found entrance to the blood, but, unassisted, are not able to develop in the body, find a suitable locality for development in an inflamed pleura or serous effusion, and under their influence a serous effusion becomes purulent. The incision into the centre of the empyemic cavity at the upper border of a rib and the washing out of the pus once or twice a day with the most scrupulous antiseptic precautions is a method which, in the hands of Quine⁶¹_{Sept. 13} and others, has proven very valuable. When the discharge becomes serous after a week or ten days, the antiseptic irrigations are redoubled in amount and care for a few days. The incision must be closed so that all ingress of air is prevented by the coaptation of the lips of the incision, while the air within the cavity is absorbed or forced out of the incision by coughing.

Treatment.—Immermann,⁹⁹_{Nov. 10} at the Ninth Congress of Medicine, Vienna, gives the following rules for the treatment of empyema: (1) evacuate the pus already formed to prevent the reproduction of a new purulent collection; (2) re-establish as directly and as completely as possible the normal condition of the respiratory apparatus. He considers Bülan's method of permanent aspiration to be the most rational. The method only succeeds, however, when the lung is expansible and yields to aspiration. The indication for this method is found in cases of recent empyema with pus not too thick, formed by streptococci and staphylococci, notably in bilateral empyema, where it will not do to make a double thoracic fistula. Schede, of Hamburg,¹¹³_{p. 612} does not favor repeated punctures by trocar or aspirating needle. Incision and resection is the only treatment, in his opinion, which is always useful and never detrimental. Curshmann¹¹³_{p. 612} is well satisfied with the method of Bülan, and had 63 excellent results out of 75 cases. Runneberg,⁴_{Jan.} also reports very satisfactory results from this method. Money⁶_{Oct. 13} records 2 interesting cases of empyema complicated with pyopericardium and pulmonary abscesses; also a case of pyohæmothorax. One was a case of pneumonia complicating parturition and resulting in multiple abscesses of the lung.

A case of encysted empyema showing the value of the exploring needle is reported by Davidson.²⁶⁷_{Apr.} In this case all pain was referred to the right lumbar region. Bacteriological investi-

gations of empyema have been made by Shaw. In 4 cases where the pus was examined the pneumococcus was found in each. The pus from 2 of these was inoculated into a rabbit and a mouse, with the result that the pneumococcus was obtained in a pure culture. The micro-organism in the pus of all examined was in a form never before seen, viz., in chains of from four to seven in number and surrounded by a continuous capsule. Some of these had peculiar, hooked shapes.

EMPHYSEMA.

Potain,³_{July 9, Jan. 22} in a clinical lecture on emphysema and tuberculosis, demonstrated that the two conditions are sometimes co-existent. The former may succeed the latter, or have preceded it. In the first case it is limited; in the latter it is often accompanied by chronic pneumonia. Vansant⁷⁶⁰_{May 17} mentions a case of compensatory emphysema which occurred in tuberculosis, where one lung was doing the work of two. Shelswell⁶_{Dec. 21, '90} reports an interesting case of extensive subcutaneous emphysema following the rupture of a vomica. Lyonnet²¹¹_{Mar. 24} exhibited a specimen to the Société des Sciences Médicale de Lyon, which was remarkable for a very extensive subpleural emphysema, in which one vessel was distended with air to the volume of the first. Longstreth²_{Jan. 22} considers muriate of ammonia essential, and sometimes gives potassium iodide to further the exudations. Handford⁷⁶⁰_{Apr. 30} has had excellent results from free drainage, in a case where tubercle bacilli were abundant in the sputum and also demonstrable in the pus, by means of a probe from the surface of the pleura. The temperature fell, the discharge almost disappeared, and the patient gained a half-stone in weight.

Cases of subcutaneous emphysema are reported by Brown,²²⁹_{Aug.} who had two of the non-surgical variety, the patients both dying. During forcible expiration, violent cough in each instance, the glottis being contracted at the time, some of the air-vesicles ruptured, and air drawn in by inspiration found its way into the interlobular connective tissue. Increasing with each subsequent inspiration, it was pushed onward, ultimately passing into the posterior mediastinum, whence it worked its way upward, appearing under the skin of the neck and face, and in the second case diffusing itself all over the body. This complication seemed to hasten the fatal termination in each case, as, before its occurrence, there

was no immediate danger impending. Verdos,¹³⁶_{Apr.-Sept.} also reports a case of general emphysema caused by catheterizing the Fallopian tubes. Wind instruments, their use with reference to emphysema and phthisis, is the subject of a paper by Hankins,²⁶⁷_{Jan.} who ventured to express the hope that the playing of wind instruments, with proper precautions, may take a prominent place in the preventive treatment of pulmonary diseases. He prefers, above all instruments, the flute. Gangrenous emphysema or malignant œdema is a very rare occurrence. A case is reported by Hoegh,⁹_{Sept. 27} of rapidly-spreading gangrene, with the development of gases in the soft tissues (the *gangrene gazeuse* of the French), with no putrid smell; at least, in the beginning. Marked constitutional intoxication, manifested by fever and great depression of the nervous system; no formation of germs, no formation of pus, and no putrid smell before contamination with putrefactive germs. The disease depends on the presence of a specific bacillus,—the bacillus of the malignant œdema which is described by Baumgarten.¹⁰⁶¹ Inoculations by this bacillus will produce an extensive œdema, but will not produce gaseous gangrene. If animals are inoculated with garden-soil, malignant œdema¹⁰⁶⁰ and tetanus are common results; but the longer the earth is dried, the less apt is it to cause malignant œdema.

ASTHMA.

Aronsohn,⁶⁹_{v. 18, No. 17, Mar. 1} reports the artificial production of asthma in a clergyman by the attempt to remove a fibrous polyp of the right turbinated bone. The patient had never before suffered from asthma and only complained of hoarseness. Schmiegelow¹⁰⁶² has written well and interestingly of asthma as considered especially in relation to nasal disease. He believes, with Germain Sée, that it must be considered a bulbar neurosis consisting in an excessive reflex irritability of the respiratory centre. This may be disturbed in its action by a competent peripheral irritation, and he thinks that nasal disease sometimes, though not necessarily, constitutes such an inciting factor in the asthmatic attack. In his own material he has noted asthma associated with nasal polypi in 22 per cent. of his cases, and with chronic rhinitis in 8 per cent. Carpenter⁷⁶⁰_{Jan. 4} has found some of his most distressing cases due to a retroversion of the uterus and pressure on the sacral nerves, the irritation being reflected to the pneumogastric. Further attacks

were prevented by reposition of the womb and adjustment of a pessary. He thinks asthma in childhood is often due to the improper management of the child at birth. A rhinitis may be developed a half-hour after birth by undue exposure and the rapid evaporation from the body and radiation of heat. The child starts in life with a cold, experiences continual recurrences, thereby establishing chronic or subacute catarrhal inflammation of the upper air-passages, which, with its *sequelæ*, furnishes the most potent predisposition to asthma. Berkhart¹⁰⁶³ makes the surprising statement that asthmatics have remarkably small hands.

Treatment.—Busey⁹_{Apr. 19} has met with much success in the use of jackets of oiled silk wadded with cotton-wool about the chest, for the prevention of asthmatic attacks. Bufalini⁵⁷_{Feb. 3} has found much benefit from the use of chinoidine; also dry fumigations, as datura, belladonna, hyoscyamus, nicotia, etc. Chivot²³⁰_{Mar.} reported favorably to the Société Médicale d'Amiens on the use of pyridine in asthma.

Hoffman³⁹²_{No. 5} recommends the subcutaneous injections of nitroglycerin, 0.005 to 0.001, in the severe cases of asthma. The action is instantaneous when used at the climax of pain in the chest. Cronigneau²⁴_{Nov. 17, '99} makes an extensive report on the use of lobeline, which he prefers to give in pill form to adults and in syrup to children. He has not observed the emetic or nauseant action with the use of this alkaloid. Drzewiecki, of Warsaw, ¹⁴_{Jan. 22} corresponding editor, reports the successful use of strophanthus in asthma, given during the attack in 10-grain (0.65 gramme) doses. The experiments of Proffer have proven that strophanthine lessens the excitability of the vagus. It is given three times daily at intervals for some time, and the asthmatic attacks have been arrested for a long period. Dieulafoy⁶⁷³_{Jan.} advises a solution of hydrochlorate of cocaine in water, 1 to 20, painted as high up as possible by means of a camel-hair brush, or, if preferred, it may be sprayed into the nose and throat. Knight⁹⁹_{Jan. 23} reports the case of a banker who could stop an attack by playing for large stakes. He does not say that other people could be relieved in the same way. Mays⁹⁹_{Apr. 2} reports marked success from the hypodermatic injection of strychnine and atropia daily. He commences with strychnine, $\frac{1}{160}$ grain (0.0013 gramme), and atropia, $\frac{1}{160}$ grain (0.00043 gramme), and gradually increases the strychnine, $\frac{1}{320}$ grain (0.00324 gramme), and

atropia, $\frac{1}{100}$ grain (0.00055 gramme). He gives three doses daily until an impression is made on the disease, then every other day, and as the patient improves it is gradually abandoned.

Levison, of Copenhagen, corresponding editor, writes us that Lisberg¹⁰⁵⁶ considers asthma bronchiale as produced by an hereditary disposition put into action by a chronic bronchitis (*catarrh sic*). By pressing melted wax through a fine hole he has been able to imitate the spirales of Curschmann, which, he thinks, are produced when mucus is pressed through the contracted bronchioli, and that they, therefore, must be considered as a product, not as the cause, of the bronchial spasm.

Phimosis, or an unnatural constriction of sphincter muscles, will, according to Edson,¹⁰² cause asthma, and the relief of this condition will relieve the asthma. The relation of asthma to other diseases is discussed by West,⁶ who holds that it stands in no relation to affections of the lungs other than to emphysema and chronic bronchitis, that it usually disappears in patients affected with phthisis, and he cited 2 cases in proof. Dyspnoea in connection with heart disease is often seen, but the paroxysms differ entirely from the true asthmatic variety. True cardiac asthma is extremely rare and most difficult to treat; it has no connection with angina pectoris. He does not think asthma due to irritation of the gastric mucous membrane itself, but to the absorption and circulation in the blood of some product of an irritating nature. Dyspnoea is common in affections of the kidney, but true asthma is very rare. It appears proven to have some connection with affections of the nose, as polypus, chronic rhinitis, paroxysmal sneezing, etc. The association of asthma with pharyngeal disease is very rare. The pressure due to diseases of the mediastinum seems to occasion asthma. Association of asthma with diseases of the brain he thinks only accidental, but a sufficient number of cases of cerebral diseases associated with asthma have been recorded to make it more than a coincidence. It has been observed, though rarely, to alternate with insanity and hysteria. He adopts the hypothesis that there is an asthma centre in the medulla, which could be acted upon from above by emotion, various psychoses, epilepsy, and some cerebral lesions; in the centre itself by uræmia and dyspepsia; from below by disturbances of the special senses (such as the olfactory and optic nerves), by stimulation of the nerves of

common sensation (as of the fifth in the face), and by cutaneous irritant rashes. He regards asthma as a reflex neurosis, producing spasm of the bronchi and diaphragm, associated with bronchial vasomotor disturbances and an unstable condition of the respiratory centre. It so closely resembles epilepsy that Hughlings Jackson defines it as respiratory convulsions.

Peyer⁴⁷⁵_{Mar.} endeavors to prove the existence of sexual asthma in a report of 11 cases in the male and 5 in the female. In almost all the male cases there was a history of spermatorrhœa, together with self-abuse and impotence, the asthmatic attacks following immediately on coitus, self-abuse, or other sexual excitement.

Asthma in children is extensively discussed by Jacobi,⁵¹_{Nov.} Romme,¹⁶⁴_{Nov. 27} Baginski,¹⁰⁵⁵_{Nov.} and Bert.¹⁰⁵⁴ The carbonate of ammonia has proved very beneficial in the hands of Fauth⁴²⁶_{Oct.} in a number of reported cases. His theory is that the carbonate of ammonia liquefies the products of bronchitis; the Curschmann's spirals become liquefied, removing the irritation, if, indeed, they cause it. Mechanically, instruments for the treatment of asthma and emphysema are fully discussed by Steinhoff.⁴_{Oct.}

PULMONARY ACTINOMYCOSIS.

Adler,⁶⁹_{June 12} demonstrated before the Berlin Medical Society preparations from a case of primary actinomycosis of the lung, with extension to the pleural and mediastinal tissues. The diagnosis was made from the course of the disease and proven by the discovery in the sputum of the characteristic actinomyces pilz. They were found in still greater numbers in the pus, which came from a fistulous tract in the breast. Wheaton,⁶_{May 21} reports a case primarily of tubercle, in which a fungus (*Aspergillus niger*) grew in the bronchi and lung, simulating actinomycosis very much. Lindt,³¹⁹_{Nov. 22, Dec. 4} records a case of primary actinomycosis affecting the apices of both lungs. The patient suffered for several years from bronchial catarrh, followed by consolidation in both apices and an abscess apparently connected with the cervical vertebra. On opening the abscess it was found not connected with the vertebra, and a large number of bodies scarcely as large as a pin-head were found; these, upon microscopical examination, presented all the characteristic appearances of the actinomycotic fungus. The sputum also contained similar bodies. The patient died four months later, and

the post-mortem confirmed the diagnosis of primary actinomycosis of the apices of the lungs, which had been reached during life.

MEDIASTINAL DISEASE.

A case of carcinoma of the mediastinum is reported by Tissier,⁷_{Dec. 20, '98} as occurring in a young woman 27 years of age. The patient died of cyanosis, the diagnosis of tuberculosis having been made. The autopsy showed the mistake; also a neoplasm, which occupied the anterior and superior part of the mediastinum. Histological examination revealed carcinoma of fibrous stroma, well developed, presenting nothing special. Letulle,⁸_{Sept. 12, '99} reports 4 such cases in a clinical lecture at the Hôtel Dieu. Cerné,²⁰⁸_{Dec. 12, '99} reports a case of pseudo-tumor of the mediastinum, where the diagnosis was made of tubercular ganglions of the mediastinum. The autopsy showed no trace of tumors, ganglionic or otherwise. It proved to be a tuberculous abscess, which had established communication with the bronchus and emptied itself. Barrett,²⁸⁵_{Nov. 12, '99} reports the medical examination of the sputum in cancer of the mediastinum and lung. The sputum was singularly gelatinous and viscid. It could be drawn out in strings 12 inches in length. Epithelial cells like corpuscles were present in great numbers, and once an imperfect epithelial cell was noticeable. Autopsy showed a new growth occupying the posterior mediastinum, which, upon microscopical examination, proved to be a slow-growing scirrhus.

Napier and Steven,²¹⁸_{Dec. '99} report a case of mediastinal tumor, presenting certain of the features of Hodgkin's disease, in a patient who had suffered from genuine rheumatic attacks. Post-mortem examination showed a large, dense mass filling the anterior and posterior mediastinum and enveloping the heart, which was lodged in a cavity on the left side of the growth. The mass was removed from the chest, and included trachea, large vessels, heart, left lung, and a part of the right lung. A portion of the spleen was also removed. Microscopic examination showed the tumor to be fibrosarcoma. Certain leading features of Hodgkin's disease were absent, especially the affection of the spleen. The reporter thought that possibly the distinct rheumatic diathesis had something to do with the disease. Was it not possible that the nodules situated in front of the patient's chest, thirty or forty in number, were rheumatic? The remarkable characteristics of the

tumor were: the peculiar way in which the growth had embraced without incorporating the normal structures and organs; the exceedingly tough, dense, and fibrous structure of the growth, almost resembling on section the myoma of the uterus; the distinct limitation of the new growth to the anterior mediastinum and the region behind the sternum, and its association with a similar growth in the neck.

Moore²_{Oct. 25} presented a specimen of a new growth of the mediastinal glands and left lung in a boy 10 years old. A dense mass of whitish new growths invaded the whole upper part of the left lung, and included all the upper mediastinal glands. The growth was a sarcoma. There were signs of pressure on the recurrent laryngeal and on the sympathetic. The left pulse was absent, owing to the complete compression of the subclavian artery, into part of which the growth extended. There was febrile temperature throughout.

PULMONARY GANGRENE.

Schrotter,⁸⁴_{Jan.} reports cases due to the entrance of foreign bodies into the lungs, and thinks that this is a more frequent cause than is generally supposed. Hirschler and Terray,⁵⁵⁹_{Nov. 30, 31, '98} by their investigations, were led to believe that in 3 cases of gangrene of the lungs the disease was caused by a micrococcus which has not yet been described, which exists not only in the sputa but in the gangrenous lung-tissue itself. They can be bred in different cultures and produce an absolutely identical smell. Animals inoculated by these micro-organisms showed quite analogous pathological, anatomical, and histological changes.

A case of pulmonary gangrene with œsophageal fistula is reported by Renault,⁴⁵⁴_{Jan.} in which the autopsy revealed a very extensive gangrene of the superior lobe, sending prolongations toward the inferior lobes. The fistula was found to be quite an old one. Jaccoud,¹⁰⁰_{Apr. 24} in a case reported, gave as treatment phenic-acid inhalations and salicylic acid. Martin⁴⁵⁴_{Jan.} recommends antiseptic treatment of pulmonary gangrene.

PNEUMOTHORAX.

Tubercular pneumothorax is discussed by Leyden, Guttman, Becher, Fraentzel, Fürbringer, Lazarus, Oldendorf, Krause, and Rothmann,⁴_{Feb. 10, 21} in a most thorough manner. Liebermeister⁶⁹_{May 1}

takes up the general subject, dealing with its etiology, course, prognosis, and treatment. Martin³ reports a case of traumatic interlobular pyopneumothorax. The subject is further discussed by Fazio¹⁵² and Nixon.¹⁶ The composition of the gases present in pneumothorax has been investigated by Hoppe-Seyler,³²⁶ who found that they contained a greater per cent. of nitrogen than the atmosphere. Oxygen is lessened and may be entirely absent in pneumothorax which has been a long time closed. The composition of the gas depends on the duration and the completeness of the closure; also on the life of the surrounding tissue and the micro-organisms present. In pyopneumothorax, marked increase of carbonic-acid gas (to 49 per cent.) has been observed. A unilateral dilatation of the bronchus, closely simulating pneumothorax, is reported by Aragon.⁷ The autopsy showed the true condition of affairs.

CEDEMA PULMONUM.

Grossmann¹¹⁴ has made some remarkable experiments concerning cedema of the lungs in Vienna. He has found that an acute pulmonary cedema occurs in dogs, and not, as hitherto supposed, in rabbits alone, from obstruction of the left auricle and compression of the left ventricle. He has learned that transudation plays but a secondary rôle in the causation of dyspnœa, and that the most important obstruction to respiration is the inflexibility of the lung on account of the cedema. Because of the vascular engorgement, there occurs an enlargement of the alveolar spaces; that is, an enlargement of the lungs. He considers transudation a factor of no importance in dyspnœa. We not only have a congestion and cedema through muscarine intoxication, but also swelling and stiffness of the lungs and bronchial cramps. He thinks that his investigations prove the primary cause of congestion of the lungs to be the narrowing of the left side of the heart; contrary to the theory of Cohnheim and Welch, who consider it due to paralysis of the left side of the heart.

Moyer,¹³⁹ contrary to his previous belief, has found pilocarpine to have a most happy effect in the treatment of pulmonary cedema.

HÆMOPTYSIS.

Pulmonary hæmorrhage occurring in elderly persons, not associated with tuberculous or cardiac affections, is discussed by

Clark.²_{Oct. 24, '90} Vascular alterations occur in elderly persons of the arthritic diathesis, resembling the vascular alterations found in osteo-arthritic articulations, and are of themselves of an arthritic nature. This variety of hæmorrhage is aggravated or maintained by the frequent administration of large doses of strong astringents, by the application of ice-bags to the chest, and by indulgence in liquids to allay the thirst created by the astringents. The treatment apparently most successful in these cases is diet, quiet, restricted use of liquids, stilling of the cough, calomel, salines, alkalies with iodide of potassium, and frequently renewed counter-irritation. Colchicum is recommended by Spencer³⁰_{Apr. 16} in this class of cases. Andrew⁶_{Nov. 1} claims that the comparative value of the two circulations—the pulmonary and the systemic—has been generally overlooked. He proves that the pulmonary vasomotor system, which, though apparently less developed than the corresponding systemic mechanism, is capable of exercising a decided control upon the flow of blood through the lungs. The author thinks it of great importance to relieve blood-pressure in hæmoptysis, and then aconite should be a much more efficient remedy for that affection than ergot. Sainsbury⁶_{Nov. 1} argues that ergot and digitalis will increase the blood-pressure and contract the bleeding vessel; whether bleeding will continue or be checked depends upon whether the rent is situated too near the heart or sufficiently near the capillaries. The difficulty in the treatment of hæmoptysis is that we cannot look inside and see whether we are dealing with hæmorrhage from a vessel of considerable size, possibly from an aneurismal dilatation, or with a capillary hæmorrhage. Until we can determine these points we treat hæmoptysis at random.

INFLUENZA.

Influenza is an epidemic, or, perhaps better, a pandemic, which sweeps rapidly over the globe from east to west, being equally prevalent in all climates and among all classes of society. The disease has a score of names, according to the countries through which it passes, the most common being influenza and *la grippe*. Influenza, the generally-accepted term, is a name given by the Italian savants of the seventeenth century, because they thought it due to the influence of the stars. *La grippe* is said to come from the Polish *crypka*, meaning "hoarse," but is most probably from

the French word *gripper*, meaning "to seize," from the suddenness of the attack. This is easily changed into the English word "grip," which, to its victims, is a very meaning term. The Germans call it *blitz katarrh*, which is also very expressive. The origin of the recent epidemic of influenza, according to Cle-mow,² Dec. 7, '89; Jan. 4 began in Siberia, at Tomsk, October 15, 1889; but Heyfelder⁸ Dec. 1 asserts that it existed in Russia in the summer of 1889.

In the early part of December, 1889, it appeared at Berlin, Paris, and Austria, and in the latter part of December in London and New York. It reached Italy, Greece, and North Africa about the same time, or a little later. A Vienna correspondent²² Dec. 14, '89 says it had its origin in or about Wassiti, Ostrow, and Kolomna, southwest of St. Petersburg, about the last week of October, 1889, and spread rapidly to the capital. Within three weeks from its first appearance the half of the populace of St. Petersburg were rendered prostrate by its influence. Buckingham⁸⁹ Jan. 10 relates that an epidemic closely resembling the influenza always appears twice a year, in January and August, in the Caroline Islands, attacking nearly everybody. This might be called the home of the influenza, providing the complaint is not hay fever. Guitéras⁵⁰ Jan. 25 dates epidemics of influenza back before the Christian era, an outbreak having occurred in the Athenian army in Sicily, B.C. 415. Epidemics occurred at irregular intervals, sweeping over Europe from east to west. No exact records have been kept up to the year 1510, when it prevailed in the British Isles to an alarming extent, and quite an accurate account of the epidemic was written. About twenty well-recorded outbreaks followed in the years from 1557 to 1879, besides many others of minor importance. It travels with greater rapidity as facilities for rapid transit improve. In about six weeks it traveled from the neighborhood of St. Petersburg to New York, which beats all former records. The extent of the disease in London may be imagined from the statement⁵⁹ July 10 that the loss in wages, due to the influence in that city, amounted to \$5,000,000, and that a like amount was paid out in insurance and sick dues by the different mutual-aid societies. During the summer of 1890 the disease appeared in Iceland,⁵⁹ Sept. 13 and spread with great rapidity. Former epidemics in this island were very fatal. About the same time it appeared in the

Azores. ²⁸⁸_{v.19, No. 27} In October 100,000 cases were reported from Tokio, Japan. ⁵⁰_{Oct. 18}

A Paris correspondent ⁸⁰_{Feb.} says that upon its first appearance there the faculty made light of it, even the Academy of Medicine assuring the people that the visitation would be a comparatively harmless one. It proved to be worse than any of the three cholera epidemics of 1854, 1865, or 1884 in Paris. They were informed later that it was not the influenza that killed, but its *sequelæ*. While in Paris it was given its Anglo-Italian name of influenza; in America it was called *la grippe*. In Paris children were largely exempt; from 20 to 60 years the death-rate was three times the average; over 60, only twice. Nearly twice as many males died as females. Wealth conferred no preventive, only the army in actual service enjoying remarkable immunity.

The etiology is discussed by Dowd, ⁵⁰_{Mar. 2} who found, in a series of observations embracing about 30 cases, the diplococcus pneumoniae of Fraenkel and Weichselbaum the predominant form. In six series, embracing 60 or more cases, streptococcus pyogenes were found in the lungs, sputum, and other secretions, and in various exudations. Each was found a great many times in pure cultures: *e.g.*, in the pus of otitis media Finkler finds pure growths of one and Levy finds pure growths of the other. The general belief is that they have not been the cause of the influenza, but that they have developed as the influenza has provided them with a suitable condition for growth, and that this development may have caused some of the complications.

Prudden, ⁵⁰_{Feb. 18} found, in 2 or 3 cases of simple influenza associated with bronchitis, very large numbers of streptococcus pyogenes, which was the prevailing species; all the rest were scattering forms, most of them ordinary aerial bacteria. In the other cases of bronchitis there were large numbers of diplococcus pneumoniae of Fraenkel and Weichselbaum, associated with a few staphylococcus pyogenes aureus and several scattering forms. The latter were the only pathogenic species found. It would seem from these observations that the relation of influenza to pneumonia is that of a predisposing factor only. The results of his investigations were rather negative. Ribbert, ⁵⁰_{Mar. 2} in bacteriological studies of 5 cases of influenza, 3 with, 2 without pneumonia, showed that the only species constantly present was the streptococcus pyogenes. The

diplococcus pneumoniæ he did not find at all. He very guardedly suggests the possibility that the streptococcus, in association with some unknown peculiar atmospheric condition, may cause the disease. Whether this be true or not, he would lay stress upon the probable importance of the streptococcus in inducing various complications.

The contagiousness of influenza has been thoroughly discussed. Trudeau,⁹ in charge of the Adirondack Cottage Sanitarium for Consumptives, fearing that an attack of the prevalent influenza might be disastrous to the many consumptives, quarantined the place against the disease as soon as it appeared in the neighborhood. His patients escaped, though it was very prevalent about them. To offset this, Armstrong⁵⁹ reports having treated over 200 cases without taking the disease, but did have it at a much later period, when he was treating no cases at all. D'Hoste, surgeon of the steamship "St. Germain," reports that that vessel left Saint Nazaire December 2, 1889. December 5th a passenger embarked from Madrid, where the influenza was raging. The next day the passenger was taken ill; four days later, the doctor; then a servant. From December 12th to January 7th, 154 out of the 436 passengers and 47 men of the crew became afflicted with the malady. The epidemic was slight, and no deaths. Hence the conclusion that *la grippe* is manifestly a contagious and transmissible malady, and that not only in its grave complications, as established by Bouchard, but also in its simple and benign form.

The varieties of the fever itself are divided into three groups by a Vienna correspondent²²: 1. Those with pure nervous symptoms, as headache, pains in the limbs, neuralgic pains in the trunk, as in pleuritis; the respiratory and pulmonary mucous membrane normal, as well as alimentary canal. This form is the most common, and has, on many occasions, been diagnosed as typhoid. 2. The catarrhal form: bronchial catarrh, sneezing, continues several days after the fever subsides. 3. Gastric: catarrh of the alimentary tract, with persistent vomiting. This writer gives the temperature as rising rapidly to 104° and 105° F. (40° and 40.6° C.). It remains at this height about two days, and rapidly falls. The duration of this fever is usually three days; seldom five or six. Little alteration of the spleen is observed,

Convalescence is variable, and seems to depend upon the intensity of the attack. Relapses are not uncommon.

Shattuck,¹ found the most striking feature of the disease the prominence and frequency of the nervous symptoms; the predominance of these, on the whole, over catarrhal, respiratory, or abdominal. He is inclined to think, however, that this is partly due to the fact that of late years our attention has been directed more to the part played by the nervous symptoms in the various diseases. Pneumonia was usually prevalent during the height of the influenza epidemic. Statistics of five large mills, where great numbers of hands were employed, show that about 40 per cent. had the influenza, and that less than 50 per cent. of those attacked by influenza acquired pneumonia. Pneumonia followed influenza in such a large proportion of cases that some sort of a connection was proven between the two affections. Guit  ras,⁵⁹ in a large dispensary practice, found only about 10 per cent. suffering from nasal catarrh; about 2 per cent. suffering from an intestinal form of the disease, having the same general symptoms as the others, with the exception that the catarrhal symptoms of the stomach and bowels have been most marked, and have shown themselves in vomiting and diarrh  a; severe frontal headache seems to occur in all cases. Pains in orbits and eyeballs were only marked in about 10 per cent. of the cases. Pains in bones and muscles were complained of in about 40 per cent. of the cases. Pepper,⁹ thinks there is much evidence to show that the exceptionally severe pains about the chest and pains in different parts of the body in this disease might well be considered partly due to general neuritis or perineuritis of varying degrees of intensity. It would seem that the view of the infectious origin is strongly supported by many facts. The existence of such neural trouble has been made clear in a number of cases by muscular and sensory *sequel  e*. Such a condition of the intercostal and respiratory nerves, and possibly of the pneumogastrics themselves, may be invoked to explain not only the chest pains, but the extraordinary weakness of the respiratory murmurs noted in so many pneumonia cases.

The urology of influenza is discussed by Chappelle,²¹¹ who says that, according to Hayem, all influenza patients have urobilin in excess in their urine. Huchard finds a constant diminution of

phosphates. Fernet, on the other hand, finds an increase in both urates and phosphates. Gautrelet ascertains that in the urine of these patients there is some hyperacidity and some increase of indican. Chappelle finds hyperacidity constant, and excess of phosphoric acid and richness in coloring matter. Indican he found four times in the two specimens examined. He did not find urobilin in excess, but generally below normal; nevertheless, all the urine examined was rich in chromogens, sometimes called uro-rosein. In 2 cases he met with skatol. Lesions in the spinal cord are described by Foa.² Numerous hæmorrhagic foci were found on microscopical examination, notably in the upper two-thirds of the dorsal and the upper portions of the cervical regions, chiefly situated in the posterior columns, almost always at their periphery. Degenerative foci were found, mostly in the lateral columns. He thinks them due to an occlusion of the vessels, probably caused by an accumulation of micro-organisms.

Hysterical symptoms following influenza are reported by Grasset, of Montpellier.⁶ A similar case is recorded by Trousseau. Rauzier reports a case of hysteria in the male following *la grippe*, the patient being a soldier, aged 28, of previous good health. A case of Ménière's disease, aural giddiness, provoked by influenza, is recorded by Money,⁶ who believes it common for influenza to disturb the balancing nervous apparatus, most probably from an effusion into one semicircular canal, but which one he is unable to determine. It seemed a peculiarity of the nervous discharge to cause vomiting, micturition, and defecation.

Alopecia areata following influenza is reported by Williamson.⁶ A widow and her seven children all had the influenza at the same time. The mother had severe headache, which continued for a long time and was followed by the loss of hair, which resulted in baldness in patches over the course of the supra-orbital and occipital nerves, the skin being very tender to the touch. Each patch exhibited the usual characteristic signs of alopecia areata.

Aural and cutaneous complications in influenza are discussed by Eitelberg,² who states that during the recent epidemic in Vienna he had seen at least 100 cases of such complications. Although very painful, the patients spending sleepless days and nights from the agonizing pains shooting through the head and

shoulders, the cases, as a rule, ended in complete recovery in a comparatively short time. The average duration was from eight to ten days. Urbantschitsch,²_{July 19} found, among numerous cases, 1 of vegetation. In 2 cases the mastoid process was transiently affected, and in 2 others the deafness remained for a certain time after the inflammation had subsided. Schwimmer⁸⁰_{Aug.} expresses the belief that the streptococcus is the cause of the erythematous and erysipelatous skin affections met with in influenza. Extensive erythema were observed in St. Petersburg; in Paris, erythematous skin inflammations, and occasionally papular eruptions; in Berlin and Vienna, erythema, herpes, and urticaria.

Treatment.—The treatment of *la grippe*, and the difference between that which prevailed during the second winter and that of the first, is the subject of a discussion participated in by Childs¹¹⁷_{Jan., '91} and nine others. They used quinine, Dover's powder, phenacetine, salicylate of sodium, salol, and digitalis. The treatment in the Russian hospitals²²_{Dec. 28, '90}; ⁸⁰_{Aug.} was antipyrin, 10 grains (0.65 gramme); codeine, $\frac{1}{8}$ grain (0.01 gramme); with a little bicarbonate of sodium. A spray of wine of ipecac and a dose of Dover's powder at bed-time have the credit of aborting the disease. Quinine and tonic meat and wine preparations are very useful after the acute stage has passed and the patient enters upon a limp and protracted convalescence. Dujardin-Beaumetz⁸⁰_{Feb.} and other Paris physicians used quinine, exalgine, and analgesine. Huchard⁸⁵_{Dec. 12, '90}; ⁸⁰_{Feb.} says that the severe nervous prostration requires alcohol and quinine, and in bad cases even injections of caffeine and ether. In the neuralgic or rheumatoid form of influenza, antipyrin, 15 grains (0.97 gramme), combined with the bicarbonate of sodium, 7.5 grains (0.482 gramme), is recommended every four hours; or, instead of antipyrin, phenacetine or salol, 7 grains (0.45 gramme). Guitéras⁵⁹_{Jan. 25} highly recommends whisky to counteract the great prostration and digitalis where the heart is weak.

Electricity in the treatment of the neuralgic and rheumatic pains of influenza has been remarkably successful in the hands of Worthington.⁶¹_{June 20} In some cases the relief was immediate and permanent. The pains in the back, groins, and sternum, of which so much complaint has been made, yield at once to thirty or forty cells of Leclanché's battery. (See section H, this volume.)

DISEASES OF THE HEART AND BLOOD-VESSELS.

By E. N. WHITTIER, M.D.;

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ARTERIAL DISEASES.

Hypoplasia of the Aorta as a Cause of Heart Disease.—A. Schabert,²¹ regards narrowness of the aorta as due rather to a failure in growth or development than to a congenital condition, because its symptoms do not become evident until puberty. While, as Virchow has shown, the condition is sometimes merely a part of the general abnormal condition, especially in chlorosis, scrofula, and hæmophilia, in other cases it seems to be more independent and uncomplicated. The diagnosis of these latter cases can only be reached by way of exclusion, upon the discovery of hypertrophy or dilatation of the heart. We have, therefore, to consider every form of valvular lesion, and, further, the possibility of poisoning from alcohol or tobacco, or the effects of high living in general; also sclerosis, atheroma, chronic pulmonary disease, nephritis, neuroses, including exophthalmic goitre, and, furthermore, heart overstrain. The diagnosis would, of course, be assisted by the presence of chlorosis and imperfect development.

Atheroma of the Aorta.—Potain,⁸ has given, in a clinical lecture, an admirable description of the signs and symptoms of atheroma of the aorta, so far as they are yet known. The rational signs are said in general not to be very distinctive, yet the careful consideration of them may enable one to discover the early stage of a disease, which, after its development into thoracic aneurism, becomes almost hopeless.

One of the first symptoms is dyspnœa, consisting sometimes in a simple sense of thoracic oppression, and aggravated by exertion; at other times coming on in spontaneous paroxysms, in which inspiration is long and painful and expiration short, although

there is no modification of the respiratory sounds. Finally, the dyspnœa may amount to orthopnœa, and be hardly bearable. There is sometimes a cough, which will be easy to recognize after it has once been heard. It is dry and frequent, strident, harsh, and deep. Sometimes a bronchitis accompanies it.

Another symptom of atheroma of the aorta is vertigo. This may be present even without aortic insufficiency. Dizziness in individuals who have neither gastric nor nervous disturbances should lead one to think of atheroma. There may also be gastric symptoms, a sense of fullness and heaviness in the epigastrium, gaseous distension, independent sometimes of the ingestion of food. Of all symptoms, however, the most important is pain. At first it is merely a sense of constriction along the middle part of the thorax,—a sort of intra-thoracic cramp. Again, it may suggest the *globus hystericus*. Sometimes the pain is extremely severe and beyond the reach even of morphine. It may radiate toward the neck or into either arm. Sometimes it extends into the right hypochondrium, and simulates hepatic colic.

This pain may be caused in either of two ways: first (according to Peter and Lancereaux), by extension of the inflammation through the coats of the artery to the cardiac plexus; secondly, by sclerosis of the coronary arteries and consequent cardiac ischæmia. This latter form is the more dangerous and more likely to be produced by physical exertion, and yet the pain itself is not apt to be so violent as in the spontaneous paroxysm occasioned by irritation of the cardiac nerves.

On physical examination, the complexion is found to be earthy and leaden. The pulse is sudden, hard, and small, but easily compressible. In cases of acute inflammation of the aorta, dirotism may be expected, due to the accompanying excitement of the heart. Examination of the latter may prove negative, but more often palpation will detect a pulsation in the second intercostal space on the right, and also a projection of the left subclavian artery above the clavicle, sometimes to the extent of 2 or 3 centimetres. This change in the left subclavian is of great diagnostic value. On gentle percussion, the area of dullness at the origin of the aorta will be found increased. On auscultation, the first sound of the heart over the aorta may be hard and exaggerated. In point of time, this aortic portion of the first sound is heard about

one-tenth of a second later than the mitral element; so that a reduplication of the first sound is heard over the aortic area. The aortic second sound is hard, resounding, metallic, in cases where the semi-lunar valves have become involved in the atheromatous process; otherwise the second sound may be normal. In the way of murmurs, there may be a systolic murmur, due either to an independent aortic stenosis or to inequalities in the internal surface of the aorta; or, where the vessel is dilated near the valve, a systolic murmur may be produced by the relative stenosis of the aortic valves, although they are really normal. Again, a diastolic murmur may be heard, either due to actual or relative incompetence of the aortic valve or to an arterio-pulmonary souffle occasioned by the sudden pressure upon the lung of the dilating artery. This last murmur differs from that heard in regurgitation because of its softness, its irregularity, and its not being propagated downward.

Peter,¹⁷ in a clinical lecture, describes the signs of atheroma of the aorta as follows: 1. An increase of the width of dullness, to be ascertained by very light percussion. 2. Tenderness on pressure in parts corresponding to the cardiac plexus. 3. Tenderness in the neck, corresponding to the right and left pneumogastric nerves. 4. A dry, hard quality in the aortic sounds; and, finally, a murmur, sometimes demanding careful auscultation in order to be detected. Epistaxis occurring in middle life should direct attention to the condition of the arteries.

Characteristics of Syphilitic Arterio-Sclerosis.—In a clinical lecture at the Hôpital Bichat, Huchard²¹² distinguishes three important phases in the anatomical and clinical evolution of syphilitic arterio-sclerosis: 1. Induration, with permeability of the vessels. 2. Vascular stenosis, with consecutive ischæmia of the organs. 3. Obliteration, with consequent local ischæmia, softening, gangrene, and localized sclerosis.

Clinically, syphilitic arteritis has quite well marked characteristics; it has no tendency to terminate in atheroma or fatty degeneration of the vessels; it is not generalized; it is often localized, and affects more especially the cerebral arteries, and secondly the cardiac arteries; it often runs an acute course and shows itself symmetrically (for example, in the two temporal arteries); finally, it has a certain tendency to terminate in vascular dilatation and the formation of aneurisms.

Consequently, syphilitic arterio-sclerosis may often be recognized by its clinical characteristics. The quite frequent coincidence of tabes and cardiac lesions (especially aortic) is explained by a common origin, viz., syphilis.

The division of syphilitic arteritis into three phases is especially advantageous from a therapeutic stand-point. For example, vascular obstruction has at length determined a cerebral softening; then specific medication is useless against a lesion which, although of syphilitic origin, is not of a syphilitic nature. Hence the necessity of an early diagnosis of the arteritis in its first, and especially at the beginning of its second period, that of vascular stenosis.

From this point of view we may consider the circulation in the organs as of two kinds: first for purposes of nutrition, and when this is impaired (that is, at the period of vascular obliteration) the almost irremediable destruction of a part of the organ is involved; second, to carry on the function of the organ, and when this is impaired an insufficient performance of function results. To this symptom the name of "meiopragia" (*μεῖω*, to diminish, and *πράσσω*, to accomplish) has been given. The second period of arteritis, vascular stenosis, is characterized by numerous meiopragias, which must be recognized and their significance understood. Thus the cerebral meiopragias are characterized by cephalalgia, somnolence, transient palsies, temporary aphasia, and slight confusion in the use of words.

For example, in a case of cerebral arterio-sclerosis during the period of vascular stenosis, a patient at the beginning of conversation or during the first quarter of an hour may speak without difficulty, because the blood-supply is sufficient for carrying on the nutrition and the function of the organ at the same time. Then cerebral fatigue supervenes, and an embarrassment of speech is noticed, which disappears quite rapidly after a short period of repose.

Cardiac meiopragia manifests itself in angina pectoris, palpitation, arrhythmia, attacks of bradycardia, and tachycardia. In the case of the kidney there will be the characteristic dyspnoea on exertion, associated with attacks of angina pectoris. The early recognition of these conditions is of practical importance for purposes of early diagnosis and treatment.

Varicose Aneurisms of the Aorta and Superior Vena Cava.—In a paper on this subject William Pepper and J. P. Crozer Griffith⁵ describe a case illustrating this rare condition, and present a summary of the 28 cases of this lesion previously reported. In many instances the diagnosis is easily possible during life, while in others it is, perhaps, impossible. Among the 28 cases which have been reported there was one recovery. The diagnosis in this case, which was made by Damaschino and Lavin, was apparently justified by the evidence.

The diagnosis of varicose aneurism of the aorta and superior vena cava may be based on the following principal symptoms, deduced from a study of the different reported cases:—

1. Cyanosis, œdema, coldness, and distension of the veins of the upper part of the body, with other evidences of obstruction to the circulation of blood in the tributaries of the superior vena cava. These symptoms were present, to a greater or less degree, in all the reported cases of which clinical histories are given. The thorax, however, does not share the lividity and œdema of the head and arms if the point of obstruction in the vena cava is above the entrance of the azygos vein. Dyspnœa may also be present, but is not essential, as it is in the event of rupture of an aneurism into the pulmonary artery.

2. The suddenness of onset of the symptoms. This marks the distinction between the obstruction of the superior vena cava in varicose aneurism and obstruction from other causes, such as compression by tumors, by constricting bands of inflammatory tissue, and by thrombosis of the vein itself.

3. Evidence from physical examination of the presence of a tumor in the chest, and the probability also that this is aneurismal.

4. The existence of a murmur characteristic of a communication between an artery and a vein. It is extremely loud and distinct in character, owing to the small size of the opening. The chief feature of the murmur is that it is continuous. During systole it is loudest and highest pitched. Neither a simple aneurism nor any form of valvular disease could produce the continuous sound. This continuous murmur is pathognomonic when present, though it is sometimes absent. The maximum intensity of the murmur was nearly always on the front of the

chest, in the neighborhood of the first portion of the arch of the aorta. In 1 case, however, the maximum of intensity of the murmur was situated in the right supra-spinous fossa.

Prognosis is most unfavorable. Death may take place in a few hours, or not for days, weeks, or even months.

Subcutaneous Rupture of an Aortic Aneurism.—Rauzier and Houzel⁸⁵_{Sept.} gives an account of a case in which a thoracic aortic aneurism proved fatal by rupture into the subcutaneous tissue of the chest-wall.

There was a large, pulsating tumor in the upper and anterior part of the right chest. The skin was not adherent. While the patient was attempting to cough the aneurism gave way suddenly into the subcutaneous cellular tissue. The patient experienced a very painful tearing sensation, and the tumor increased in size, the outline of the aneurism being obscured by the effused blood, which gradually extended toward the axilla. After the attack of syncope, which followed the sudden pain, the patient required morphia to relieve her suffering, which was intense and accompanied with violent dyspnœa. Next day the swelling occupied the whole mammary region, and extended to the axilla. Pressure on the axillary artery caused the disappearance of the radial pulse on the right side. The next day there was jaundice, and the blood was spreading over toward the back of the right side of the chest. On the third day after the rupture the patient died. Death was caused by the escape of the large quantity of blood into the cellular tissue, and not, as is usual in such cases, by sloughing of the skin over the escaped blood and hæmorrhage through the opening made by the slough.

A rare case of aneurism, in a girl 12 years old, was shown before the St. Petersburg Medical Society by Pendin.²¹ The patient was a strong, well-nourished girl. At the age of 6 years she had fallen and struck her right side, and since that time had moderate pains in that region. There was no dyspnœa or cough. On the following physical signs a diagnosis of aortic aneurism was made: at the right of the sternum an area which was slightly prominent, dull on percussion, and pulsating; pulse in both wrists somewhat delayed relatively to the apex-beat; a double murmur heard loudest over this area. Aneurism at so early an age is extremely rare.

ENDOCARDITIS.

Etiology and Pathological Anatomy.—Weichselbaum¹⁹ made bacteriological and microscopic examinations in 29 fatal cases of endocarditis, with the following results: in 8 cases (endocarditis verrucosa) there were no micro-organisms in the deposits upon the valves; in 21 cases there was a positive result, 7 presenting the diplococcus pneumoniae, 6 the streptococcus pyogenes, 2 the staphylococcus aureus, 2 the bacillus endocarditidis griseus, 1 the micrococcus endocarditidis rugatus, 1 the bacillus endocarditidis capsulatus, and 2 a bacillus the endeavor to cultivate which did not succeed. In 1 case there were three varieties of bacteria present, but in none of the others more than one. Most of these cases where bacteria were found were ulcerative endocarditis. The author is led to believe that the micro-organisms are the primary cause of endocarditis, especially as it was possible in all these cases to reproduce the endocarditis in rabbits, provided the valves had been previously submitted to some mechanical injury. If, however, the valves of the animal experimented upon were healthy and intact, it proved almost impossible to excite endocarditis, and the author infers from this that the disease is brought directly by the blood-current to the valves, and not through the capillary channels.

J. G. Truax⁶¹ reports 6 cases of ulcerative endocarditis. One patient, who had been feeling badly for two weeks, but did not think he was sick enough to call a physician, had just entered a restaurant to get his lunch; and, "while waiting to be served, he suddenly jumped to his feet, and, taking hold of a chair, commenced smashing everything within his reach." The next day the writer was called in consultation to see him, and a diagnosis of ulcerative endocarditis was made. Another physician, a specialist on nervous diseases, made a diagnosis of acute mania, and with his advice the patient was sent to an insane asylum, where he died. The autopsy disclosed ulcerative endocarditis.

The writer closes his paper with the following observations:

1. In none of his cases was the disease primary and uncomplicated.
2. The heart-lesions were not always associated with heart-murmur.
3. The temperature and many of the symptoms were common with those of typhoid fever.
4. In none of the writer's cases did the temperature rise above 104° F. (40° C.). It was lower in the

morning, higher in the evening. 5. Meningitis was almost always present. 6. Two cases were complicated with tuberculosis, 1 with pneumonia, 1 with pleurisy, 1 with hypertrophy of the heart, and the other was not sufficiently examined. 7. Treatment seemed to have no particular effect, excepting hypnotics; Fowler's solution, quinine, and bichloride of mercury were tried. 8. Cultures were made in 3 of the malignant cases for micro-organisms; none were ever found. The writer still inclines to the belief that the disease has for its cause the infection of some germ.

F. C. Shattuck⁹⁹_{July 24} reports a case of malignant endocarditis secondary to colitis, and another secondary to gonorrhœa. C. E. Stedman⁹⁹_{July 24} also reports a case of malignant endocarditis, preceded by articular symptoms, which had followed a gonorrhœa. J. S. Ely⁵⁰_{Mar. 16} presented to the New York Pathological Society a heart showing the lesions of malignant endocarditis, in which the source of the infection was probably a urethritis. Trippier³_{Apr. 20} reports a case of tuberculous endocarditis in a boy of 14, who died of miliary tuberculosis.

18/ *Treatment.*—Pye-Smith⁶_{Oct. 4} reports a case of recovery from ulcerative endocarditis in which emboli had been observed in various arteries, forming aneurisms. He instances cases in which a slight form of pulmonary stenosis had allowed of patients attaining adult life. One lady was living over 50 years of age. Next to this was a young man who died at 24. In aortic obstruction prognosis depended on the cause. In the senile form, fatal syncope was not uncommon. Degenerative sclerotic processes of later life were more dangerous than the rheumatic changes of youth. The completeness of compensation was to be judged of by general signs, easy respiration, etc., rather than by the amount of hypertrophy and dilatation present. In children the lesions developed were almost always rheumatic. There was in them very little danger of sudden death, and much less liability to dropsy. The aspect often suggested phthisis. Treatment often had the most striking results in the worst cases,—for instance, in water-logged subjects, where digitalis, tapping of the abdomen, or acupuncture of the legs (preferred, on the whole, to Southey's tubes), rescued from the brink of the grave. The sitting posture in a high arm-chair often helped; water gravitated to the legs. Strophanthus he had not found better than digitalis. Convallaria was quite inferior

to either, but good for dropsical children. Hyoscyamus relieved pain. Antipyrin was unsafe. Sulphonal, in hot milk, or with tincture of lavender, was useful in restless conditions. Venesection might be used to subdue pain and to relieve the distended right side of the heart. He disapproved of Oertel's treatment by heart gymnastics, which were likely to disturb compensation.

VALVULAR DISEASE.

Aortic Insufficiency.—Julius Schwalbe⁶⁹ gives a *résumé* of his observations and views upon insufficiency of the aortic valves, founded upon more than 50 cases, of which about 20 came to autopsy: 1. The diagnosis of this valvular lesion depends upon an examination of the heart and especially by means of auscultation. 2. The predominance of hypertrophy or of dilatation, respectively, of the left ventricle depends upon the size of the valvular defect and the nutrition of the muscular tissue of the heart. Often, however, both processes begin simultaneously. 3. The dilatation of the left ventricle is due to the following factors: (a) the regurgitation of blood in the beginning of the diastole; (b) the aortic pressure during the whole diastole; (c) the tension of the left auricle during its contraction; (d) when the cardiac muscle becomes enfeebled, the stretching of the ventricle during its own systole. 4. The character of the diastolic murmur is influenced by the size of the gap in the valve, the variations in the blood-pressure, and the behavior of the left ventricle. 5. Numerous observations have established the occurrence of a relative insufficiency of the aortic valves. 6. The diastolic-systolic double tone heard in the femoral artery and also the diastolic-systolic murmur produced by pressure upon the same artery are of great value in the diagnosis of aortic insufficiency, although not pathognomonic. 7. The frequent occurrence of nephritis as a complication is explained by the etiology and by the circulatory conditions of this valvular lesion.

Martius⁶⁹ reports a case of aortic insufficiency, accompanied by mitral regurgitation and great dilatation and hypertrophy of the left ventricle, in which, however, the apex-beat could scarcely be felt, and the cardiac impulse was surprisingly slight during the whole course of the disease, and in all positions of the patient, whether standing or lying. The author regards this surprising

absence of the apex-beat in a case of hypertrophy as a confirmation of his views with regard to the production of the apex-beat in general, one essential condition for which he believes to be the temporary closure of the cavity of the left ventricle during the first half of the systole, before the aortic valves have been forced open. In the case under consideration the mitral regurgitation precluded the fulfillment of this condition. In the discussion which followed, P. Guttman stated that he believed absence of apex-beat in cases of this combined lesion not to be the rule.

Huchard³_{May}, exhibited a patient with aortic insufficiency, who presented the unusual symptom of tonsillar pulsation, the motion being communicated to the tonsils from the internal carotid arteries. In the same connection Huchard spoke of the etiology of arterial disease in general, adding heredity to the well-known causes (syphilis, lead, alcohol, tobacco, rheumatism, gout, excessive muscular effort).

F. P. Müller³⁰⁹_{No. 14} reports a case of aortic insufficiency complicated with pulmonic insufficiency in a patient 22 years old, where there was arterial pulsation of the tonsils, pillars of the fauces, the palatine arch, and of the uvula. In 6 other cases of aortic insufficiency which he afterward examined 3 presented the same symptoms.

Drasche,⁸⁴_{Dec. 21, '98} in discussing the true compensation of valvular disease of the heart, speaks particularly of aortic incompetence, his view being that the elasticity and power of development of the three cusps of the aortic valve is so great that if one leaflet becomes shriveled the other two in certain cases extend themselves so as to make good the deficiency. A brilliant example of this occurrence was demonstrated by the author in a preparation taken from the body of a patient who died of endocarditis, after having suffered for thirty years from aortic incompetence. The diastolic aortic murmur had become very much enfeebled some time before death. The posterior leaflet of the valve had attained a size of 4.5 centimetres by 2 centimetres, while the two remaining valves together extended only 3.8 centimetres by 1.5 centimetres, although normally all three leaflets are practically of the same dimensions.

Mitral Stenosis.—Lenhartz⁴¹_{May 12} has made numerous observations extending over years upon patients who presented the clinical symptoms of a pure mitral stenosis, and has arrived at a view dif-

fering from that thus far held. He believes that even with marked stenosis the compensatory changes render possible an average filling of the left ventricle. Furthermore, by searching in the lists of the pathological institutes at Leipzig and Halle he has collected a report of the autopsies of 98 cases of mitral stenosis. In only 7 of these was the classical "concentric atrophy" found; in 2 the left ventricle was comparatively small; in the rest it was either normal, hypertrophied, or dilated.

A. E. Sansom,⁵ in discussing mitral stenosis in children, says: "I hold it proved that in all cases mitral stenosis is the result of endocarditis, that in the great majority of cases this endocarditis is due to rheumatism, but that in a small minority it may be due to other influences, amongst them overstrain within the heart. . . . It is not unreasonable to infer that the violence done to the delicate valve-structures of the child under the conditions of extraordinary terror may be the initial of a limited endocarditis, which may induce regurgitation or may progress to stenosis." In an analysis of the pathological appearances of 40 cases of mitral stenosis, at all ages, he reports the condition of the left auricle as follows: dilatation and hypertrophy, 10 cases; hypertrophy, 3 cases; dilatation (extreme dilatation in 7 cases), 18 cases; and, of the left ventricle, normal or very slight hypertrophy, 12 cases; cavity noted small, 3 cases; wall noted thin, 1 case; hypertrophy, 9 cases; dilatation (in 1 case slight dilatation only), 3 cases; dilatation and hypertrophy, 3 cases. These figures illustrate the possibility of hypertrophy and dilatation of the left ventricle in case of mitral stenosis; but in children affected with mitral stenosis the left ventricle was usually of normal or sub-normal dimensions. When enlarged, it was usually in association with general hypertrophy of the heart and pericarditis.

Richard Geigel⁶⁹ reports a case of alternating mitral insufficiency. The patient was a servant-girl, 20 years old, who entered the hospital for facial erysipelas, which took a rapid and favorable course. The patient was so modest that upon exposing the breast to listen to the heart, the previously regular pulse would become irregular, and then, in a little while, take on action corresponding to the pulsus bigeminus; then, finally, the heart would quiet down and become perfectly regular. On physical examination the heart was normal, except during the time of the pulsus bigeminus,

when the second of the two pulse-waves was found to correspond to a systolic apex-murmur, with accentuation of the pulmonic second sound, although in the first of the two revolutions the sounds at both base and apex remained normal. The author believes that the brief diastole between the first and second contractions of the left ventricle did not allow sufficient blood to enter that cavity to cause the mitral valves to float out preparatory to being closed by the ventricular systole, or that, perhaps, there was defective innervation for the papillary muscles in the second cardiac revolution following so quickly upon the first.

Tricuspid Stenosis.—Oscar Hirschberg,⁴¹ regards certain circumstances as making the diagnosis of tricuspid stenosis probable, although it is difficult to be positive in the matter during life: first, comparative smallness of the area of cardiac dullness, in cases of valvular lesions which usually are attended with enlargement of the heart; second, persistent fullness of the pulsating jugular veins during the diastole of the ventricle; third, absence of accentuation of the second pulmonic sound, in spite of the existence of mitral disease; fourth, a diastolic, long-drawn-out murmur, loudest over the tricuspid area, of a different quality from diastolic murmurs heard at other orifices; and, finally, the long continuance of tricuspid insufficiency would render probable the addition of a stenosis to the clinical picture. Among 20 cases of clear tricuspid stenosis, 17 had lesions of the mitral and 11 lesions of the aortic valves. The maximum age reached with congenital stenosis was 27 years, the minimum 4 years.

Rupture of Chordæ Tendineæ.—Hale White,⁶ Dec. 7, '98, showed a specimen taken from a man, aged 19, who had rheumatic fever some years previously, and while one day following his ordinary occupation was so suddenly taken with shortness of breath that he had to go home to bed. The chordæ tendineæ had ruptured from the aortic cusp of the mitral valve. Dickinson,⁶ Dec. 7, '98, quoted the case of a bricklayer, aged 24, who, being apparently quite well, while engaged in lifting bricks became suddenly collapsed, and in whose case the diagnosis of ruptured chordæ tendineæ of both mitral cusps was made and subsequently confirmed by autopsy.

Presystolic Murmur Without Organic Disease of the Mitral Valve.—The presystolic murmur has very generally been considered

a positive sign of mitral stenosis. Robert Maguire, of London, ⁹⁰ reports 2 cases in which, besides systolic and diastolic murmurs connected with the aortic valves, there was heard just inside and above the apex-beat a blowing, presystolic murmur, limited to a small area. The autopsy showed thickening and shrinking of the aortic valves, causing marked incompetence; but the mitral valve was normal, except that the anterior flap was slightly thickened and its ventricular surface very slightly roughened. This slight change in the mitral valve was probably due to irritation from the stream of blood regurgitating from the aortic orifice during diastole.

The murmur is explained as being produced by vibration of the mitral valve at the time when the current of blood regurgitating from the aorta meets the opposing current which enters the ventricle from the auricle. No clear explanation has been given why this murmur is heard in some cases of aortic regurgitation and not in others. Nine other cases have been reported, where the presystolic murmur has been heard, in which the lesions were confined to the aortic valve. Dr. Maguire thinks that the presystolic murmur in such cases is not very rare, and is supported in this opinion by Broadbent.

In a more recent paper by D. B. Lees ⁵ 4 additional cases are reported in which a presystolic murmur heard during life was proved post-mortem to be associated with disease of the aortic valve, the mitral valve being normal.

Graham Steel, ⁹⁰ while enumerating certain fallacious auscultatory signs, describes a cardio-respiratory murmur heard in 2 cases at the apex of the heart and audible in the axillary region and in the vertebral groove about the inferior angle of the scapula. The general evidence in the cases mentioned was very strong against there being any heart disease at all. The individuals had had no antecedents calculated to bring about heart disease. There was no shortness of breath whatsoever, and the heart was normal in size. Moreover, the heart-sounds were perfectly normal over that portion of the organ which is not covered by lung; and, further, the murmur varied in intensity with respiration, being much louder during inspiration and ceasing entirely when the breath was held at certain points of the respiratory act, usually at the end of expiration.

MYOCARDIAL DISEASE.

The Innervation of the Heart.—At the Ninth Congress of Internal Medicine, held at Vienna, Romberg and His² described experiments on the innervation of the heart. They had studied the embryology of the nervous system of the human heart, and their results were at variance with the opinions commonly held as to the physiological functions of the cardiac ganglia. The first formation of the cardiac nerves appeared to be at the end of the fourth week. The cardiac ganglia were parts pushed forward by the sympathetic ganglia. The latter, according to the investigations of Onodi, belonged to the territory of the posterior roots, hence to the sensitive system. Thus, the cardiac ganglia were sensory, and unless it was pretended that the same ganglion-cell could at the same time be sensory and motor, which was an untenable view, the cardiac ganglia possessed no motor functions. They thus were neither automatic cardiac centres nor active agents in inhibiting or accelerating the beat of the heart. Romberg particularly emphasized the fact that the heart of the embryo contracted rhythmically long before it had nerves or ganglia. It might perhaps be that the cardiac ganglia conveyed to the central nervous system the “unconscious sensations” which reflexly regulated the beat of the heart through the vagus and the accelerator nerves and dominated the size of the system of the blood-vessels. As the hypothesis of an automatic nerve-centre of the heart had thus to be given up, the rhythmic action of the heart could only be explained by an “automatia” of the cardiac muscle itself. Such an “automatia” was more easily comprehended from the anatomical and physiological properties of the cardiac muscle. The cardiac muscle is the automatic motor of circulation without being irritated to move by nervous elements. The cardiac muscle thus appears to be of a greater importance pathologically than heretofore.

Palpation in Diagnosis.—Peter³ advocates the methodic employment of palpation in the examination of the heart, in order to determine the presence or absence of tenderness. If there is pain on pressure at the level of the fourth, fifth, or sixth intercostal spaces over the heart, myocarditis is likely. Tenderness localized in the third and fourth spaces corresponds to the coronary nerves, in which case the left pneumogastric will be found to be tender along

the internal border of the sterno-mastoid. Tenderness on pressure at the level of the second and third intercostal spaces is referable to the cardiac plexus. In this case the pneumogastric is apt to be sensitive and often spontaneously painful, and the patient complains of a painful drawing sensation along the neck.

Vanheeuverswyn,²²⁰ in an article comparing the asystole of the left side of the heart and of the right, states that when, in any cardiac affection, the equilibrium of the circulation is disturbed, the failure is referable either to insufficiency in the impulse given to the blood by the left ventricle or to the impermeability of the lungs. Where the failure is in the left ventricle the arterial tension is low, the pulse small, œdema of the ankles appears and increases, and yet the venous system is not engorged. There is no cyanosis; the vessels of the neck are not swollen. Breathing is easy except upon exertion. On the other hand, where there is pulmonary obstruction to the circulation, whether due to stenosis or to emphysema, the pulse is normal, the face cyanotic, the dyspnœa continuous; the veins are distended, first near the heart and then in the extremities. Œdema of the extremities is a late symptom, and when it does appear the limbs, instead of being white, soft, and easily reduced, as in the first case, are hard, dark-colored, and constantly swollen.

Dilatation of the Heart at the Time of Puberty.—Pitt calls attention¹⁵⁸ to a group of symptoms which not infrequently occur at the time of puberty, and to a plausible explanation of the same. He has observed 8 cases, 7 of them being girls. Most of them had grown tall very rapidly and in none of the girls was menstruation normal. The symptoms consist in debility, want of energy, palpitations, dyspnœa after exertion, and disagreeable sensations in the region of the heart. In most of the cases there was weak pulse, diffuse heart-impulse, with a weak first sound and an accentuated second pulmonary tone. In 2 of the cases there were functional systolic murmurs. The explanation of these phenomena is to be found in the great changes which take place in the heart and great vessels at the time of puberty, as shown by the measurements which were made by Beneke.

During the first years of life the heart gains 80 per cent. in volume, while between the 7th and 14th years the gain is only 8 per cent. At puberty it again gains 80 to 100 per cent. in volume.

If the changes incidental to puberty take place in one year, the heart doubles in volume at that time. Thus the development of puberty is accompanied by a *pari passu* increase in the volume of the heart. The conclusion from the foregoing is that when the heart is not in condition to develop rapidly the phenomena of puberty must be protracted. The consequences of the great demands which are made upon the heart at this period are manifested in the common occurrence of a slight degree of dilatation and in deficiency of heart-energy, which is especially noteworthy in individuals who grow rapidly at the time of puberty. In such persons the changes of puberty are often prolonged or are incomplete as a direct consequence of the unsatisfactory increase in blood-pressure. Girls are more apt to suffer than boys, because at this age they are weaker. The treatment required by this condition consists of regular physical exercise, without overexertion, a nap for at least two hours every day, and the internal use of iron and arsenic. The food should be abundant and nutritious. Under this treatment all the disagreeable symptoms will disappear entirely within a few months.

Acute Overstrain of the Heart.—Schott, of Nanheim,⁸⁴ stated before the Kongres für innere Medizin that the existence of acute overstrain of the heart could no longer be doubted since the description of cases of this sort by Leyden, Fräntzel, and himself.

He had made experiments with the view of producing acute overstrain of heart in healthy and vigorous men by making them struggle until dyspnœa came on. In a second series of experiments the body of the struggling person was compressed by a girdle applied below the arch of the ribs, thus increasing the intra-cardiac pressure and making the action of the heart extraordinarily difficult. All the symptoms characteristic of acute overstrain of the heart were thus produced, namely, dyspnœa, arrhythmia of the pulse, tachycardia, etc., and, above all, dilatation of the heart, including auricles and ventricles. In the second series of experiments the heart sometimes assumed quite considerable dimensions. These conditions were exactly recorded by means of tables, pulse-curves, measuring of pulse-pressure. Cases were also mentioned in which symptoms of acute overstrain of the heart were produced by lifting heavy objects, climbing mountains, dancing, and particularly tight lacing, velocipede-riding, etc. In healthy individuals all the symptoms

disappeared without leaving any trace; but when there had been any cardiac affection, whether functional or involving the valves or myocardium, the disturbances might last for a long time and increase to the most dangerous degree, even death. Treatment consisted in absolute rest and nourishing food. Severe pain in the cardiac region required morphine and hot poultices.

Angina Pectoris.—Rendu¹⁰⁰ believes that, while some cases of angina pectoris are symptomatic of an organic lesion, others form part of a neurosis, and in this latter the symptoms are more alarming than dangerous. The functional form is characterized by these symptoms: 1. In being nocturnal, without exciting cause. 2. In being frequently preceded by a peripheral aura. 3. In the pain being more diffuse and often associated with an intense hyperæsthesia of the præcordial region. 4. In being accompanied by disordered action of the heart, not by a slow pulse, with a sobbing respiration, and sometimes with a loss of consciousness, as in *grande hystérie*. 5. In being more frequent than the true angina.

Female patients have been unable to go to bed for five, ten, and even thirty nights in succession. The influence of menstruation and of mental disturbances illustrate still more the neurotic character of the attacks.

Renault⁵² describes a new disease of the heart under the name "essential disintegrating myocarditis" (*myocardite segmentaire essentielle*), characterized anatomically by a softening of the cement which unites the muscular cells of the heart end to end. It is found unaccompanied by lesions of the serous surfaces, cardiac cirrhosis, or endarteritis of the coronary arteries. The disease occurs especially in old persons or in the victims of alcohol or gout. It sometimes occurs as the sequel of acute diseases, such as typhoid fever. In it the pulse and the heart are irregular. Even if the pulse seems regular to the finger, a sphygmographic tracing will show that the successive pulsations are not equidistant from one another nor of equal force. Another important sign is the absence of any localized præcordial impulse. A third sign is that the præcordial dullness on percussion assumes a rectangular shape, bounded on the left by a vertical line reaching from the fifth to the third intercostal spaces inside of the nipple, on the right by a line parallel to this along the left edge of the sternum, and above and below by horizontal lines joining these two vertical

ones so as to form a rectangle. Upon auscultation, the heart-sounds are found to be weak and more or less irregular in rhythm. Sooner or later there appears a medio-cardiac systolic souffle, heard half-way between the place of the apex-beat and the region of the aortic valves. This murmur is soft in character, not transmitted, and may be temporary or permanent. There is no swelling nor tenderness of the liver, no enlargement of the veins in the face, nor any sign of dilatation on the right side of the heart. Eighty-one per cent. of the patients have a very slight œdema of the ankles, never reaching higher than the knees. There may also be a certain amount of pulmonary œdema, confined to the bases, with a predilection for the left base. The condition is a dangerous one, and individuals who suffer from it succumb to the most trifling intercurrent diseases. Bronchitis is a frequent and fatal complication. The treatment comprises digitalis and general tonics.

Von Recklinghausen³ believes that the death agony suffices for the production of this disassociation of the fibres of the heart which Renault describes. He denies that it has yet been shown that it occurs as a disease.

Syphilitic Disease of the Heart.—Alfred Buchwald, of Breslau,⁴¹ is convinced by a large number of cases which he has treated during the past six years, and a part of which he has kept under observation, that syphilitic myocarditis is a far more frequent disease than is supposed; that the peculiarities of the disease are sufficient to permit of a diagnosis being made; that through anti-syphilitic treatment not only improvement but even cure can be brought about; and that it is of great importance to make an early diagnosis and to attribute the lesions to no other cause than syphilis. He can count up more than 20 cases of his own of which the syphilitic origin is certain. They are mostly of men of the better class. Among laborers a diagnosis is much more difficult, because excessive exertion and abuse of alcohol cannot be excluded as etiological factors.

The patients were all in the prime of life, from 20 to 40 years of age. The length of time which intervened between the syphilitic infection and the development of the heart-lesion varied from five to twenty years, but in the majority of cases was six to ten years. Some of them still had affections of the skin, glands, or other organs, while in others no visible syphilitic symptom yet

remained. In most the physical condition was good, but in others there was emaciation, anæmia, and cachexia. In 3 cases, without the intervention of rheumatism, there was developed evident valvular disease, aortic and mitral insufficiency. In all the cases every other etiological element, as abuse of alcohol and tobacco, and rheumatism, was certainly excluded. Syphilis was not only unmistakably indicated by the symptoms and history, but its existence was demonstrated by cure being brought about by anti-syphilitic medication. When myocarditis and valvular disease are developed in well-marked syphilitic cases, and are seen to disappear under syphilitic treatment, the conclusion is inevitable that the cardiac lesions are syphilitic.

In the majority of cases the patients complain of headache, dizziness, flashes of light, loss of strength, palpitation, dyspnoea, feverishness, and sore throat. There may be also emaciation or symptoms of angina, pectoris, and neuralgic pains like those of aneurism. In almost all cases there was irregularity of the heart, more or less cardiac hypertrophy, and, what is especially noteworthy, alterations in the peripheral vessels, such as are commonly ascribed only to old age. The arteries were hard and tortuous, more especially the temporal arteries, and to a less extent the radials. In the latter cases the pulse is small. Some cases showed the general appearance of premature old age.

The course of the disease was also characteristic. The cases in which the heart insufficiency could no longer be influenced favorably ran a rapid course, developing marked anæmia and consecutive kidney disease, and sometimes repeated pulmonary infarction with hæmoptysis. The majority of cases showed a great and rapid improvement under purely antisiphilitic treatment, which consisted sometimes of large doses of iodide of potassium and in other cases of mercury. One case, which developed aortic insufficiency while under observation, was so much improved that no trace of the lesion was recognizable. Another, whose heart-lesion was cured, developed sudden aphasia and cerebral disease, but recovered from this also under large doses of iodide of potassium. In other cases the peripheral arteries recovered from their hard and tortuous condition, and at the same time the general appearance of the patients was much improved. The author has no doubt that a great number of syphilitic persons will, sooner or later,

develop syphilitic myocarditis, with or without vascular disease, and that it is of the greatest importance to make an early diagnosis of this condition and begin antisyphilitic treatment.

Obolensky⁴ describes a case of angina pectoris of which a syphilitic affection of the vagus seemed to be the cause. This diagnosis was arrived at by exclusion. There was no evidence of aneurism, chronic myocarditis, fatty degeneration, or fatty infiltration of the heart, nor were any of those conditions present which sometimes produce angina pectoris in a reflex way, such as hepatic colic or movable kidney, nor any unnatural condition of the central nervous system. Moreover, the left pneumogastric was tender upon pressure in the neck. An energetic specific treatment resulted in cure.

Fatty Heart in a Young Subject.—Fatty degeneration of the heart is an uncommon occurrence in early life. A case is reported by Lowther.² A young man, aged 22, apparently robust, after a rapid walk of about 2 miles suddenly fell down, dying instantly. Marked fatty degeneration of the pericardium and heart was found.

Calcareous Diseases of the Heart.—A remarkable case illustrating this condition is reported by David Drummond.⁵ A sailor, aged 43, was admitted to the Royal Infirmary, Newcastle-on-Tyne, for cough and dyspnoea. Patient's illness began while at sea fourteen weeks previously, when he caught cold and began to suffer from cough, with copious expectoration. He continued to work four or five weeks longer, when increasing dyspnoea and oedema of legs compelled him to seek medical advice. On examination the legs were oedematous, face cyanotic, respiration rapid, pulse irregular and weak,—84 at the wrist and 100 when counted with the stethoscope. Action of heart was irregular and tumultuous, and the sounds lacked clearness. Systolic murmurs were heard at the apex and in the tricuspid area. There was considerable enlargement of the heart and the right chest was nearly full of fluid. Cyanosis and dyspnoea gradually increased and the expectoration became blood-stained and frequently "prune-juice" in color. Twelve days after admission he died.

At the autopsy the pericardium was found adherent to the heart, both together weighing 1 pound and 10 ounces. Speaking generally, the outer layer of the parietal pericardium could be dis-

sected off the heart as a membrane, leaving an inner layer adherent and calcareous. On removing all that could be dissected of the pericardium, the heart-walls were seen to be composed largely of calcareous matter, arranged irregularly in nodular masses. This material was most abundant at the back and toward the right side of the organ. Running across the front of the left ventricle was a thick ridge of bone-like substance, varying from $\frac{1}{2}$ inch to 1 inch in breadth. It penetrated deeply into the heart-muscle, especially toward the left side, where a wedge-shaped nodule, the size of a walnut, passed quite through the heart, its apex presenting prominently among the columnæ cornæ. This ridge was firmly attached at both ends to the great bony case that enveloped the heart. The whole of the right ventricle was encased in a dense, calcareous envelope, and had to be opened with a saw. The walls of this case varied from a quarter of an inch to an inch in thickness, and they were intimately incorporated with the heart-muscle. On its surface were several cavities, the size of small filberts, that contained putty-like material. The calcareous case encroached to a considerable extent upon the right auricle; one nodule passed between the muscoli pectinati, appearing as a yellow mass on the internal surface of the auricle, covered only by a thin layer of endocardium. The myocardium generally was friable and pale, but the valves were normal; the wall of the left ventricle was considerably hypertrophied; the coronary artery was highly atheromatous. The view taken of the condition of the heart was that the disease originated as a non-rheumatic pericarditis, perhaps of a tubercular nature, and that myocarditis followed, the deposit undergoing calcareous degeneration. Calcareous pericardium is undoubtedly a rare lesion, and one that has seldom, if ever, been diagnosticated during life. The disease suggested by a careful consideration of the signs and symptoms of the present case was mediastinal new growth. It is a wonderful fact that the patient was able to follow the arduous employment of a sailor before the mast, with but trifling inconvenience, when it is considered that for years the bony case must have interfered with ventricular contraction.

A specimen of *cardiolith* was shown to the London Pathological Society by Delépine.⁶_{Jan. 11} It was taken from the body of a female child aged 5 years, who died of diphtheria, apparently by cardiac failure. The stone was not the result of the last illness,

and it seemed very unlikely that it was the cause of death or seriously accelerated the fatal event. The concretion was taken from the right ventricle and was situated between the right segment of the tricuspid valve and the adjacent portion of the ventricular wall. It measured $\frac{3}{4}$ inch in length by $\frac{1}{2}$ inch in breadth and $\frac{1}{2}$ inch in thickness. It was covered with a smooth, glistening membrane, and was adherent to the endocardium by four short, fibrous-looking bands. It was composed of carbonate and phosphate of lime and some fibrous tissue and hæmatin crystals. From this structure it was evidently nothing more than a partly calcified cardiac thrombus. The heart was in other respects normal. The concretion had doubtless been growing slowly for years, and quite possibly might have begun to form during foetal life.

MISCELLANEOUS.

The Senile Heart.—A valuable series of papers on the symptoms and *sequelæ* of the senile heart was written by George W. Balfour. ⁸⁶
Jan., Apr., June According to this author, tachycardia is the commonest phenomenon associated with the senile heart, and varies in its nature, quality, and course. Tachycardia is a term originally applied to cases of a paroxysmally rapid but regular pulse of neurotic origin. The rapidity of the heart-beat is more continuous than in mere palpitation, but less forcible. It may last for days, weeks, or many months, even for years. The heart-beat is feeble, at times conveying an impression of irregularity; the pulse is rapid but regular; and the blood-tension low. The heart seems to be set free from the inhibition of the vagus and to be run off with by the accelerators, the augmentors taking no part. In this tachycardia differs from its most closely allied congener, Graves's disease, in which forcible pulsation of the heart and the vessels of the neck is an early and sometimes an only symptom. There are, also, cases in which from childhood onward the heart beats persistently at about 150 per minute, without apparent detriment to health, the heart-rate slowing off as age advances. An instance of this is reported in a lady over 70, who was married and had a large family, with a pulse never under 150 till recent years, when it has become very much quieter,—down to about 70. In this case there was always perfect health, associated with a highly neurotic temperament, and there was never any forcible or distressing pulsation,

either in the cardiac area or at the root of the neck. And the same may be said of another case in which the tachycardia came on about middle life, persisted for years, and was followed by threatening of symmetrical gangrene of the finger-tips, which was perfectly recovered from.

In connection with the senile heart, and apart from all other causes, Balfour has seen many cases of tachycardia, pure and simple, lasting for months or years, some in whom recovery took place, and who, after recovery, had again—sometimes after years—a relapse, owing to some break-down in the general health. The converse of tachycardia is bradycardia,—abnormal slowness of the pulse. This has been, in his experience, a much more common concomitant of the senile heart than the typical paroxysmal tachycardia, though by no means so common as simple tachycardia. There are two well-marked varieties of bradycardia, one in which the heart beats at its normal rate, but every second or third pulsation is too feeble to reach the periphery; so that we have a pulse beating at half or sometimes only at a third of the rate of the heart. In the second variety heart and pulse are alike slow, and the rate may even be less than 30 per minute; in one case it was down to 17. In the author's experience, there have been many more really slow hearts than hearts beating at the normal rate, but with abnormally slow pulses. All slow pulses, from whatever cause, are apt to be alarming, from the tendency in such cases to pseudo-apoplectic and pseudo-epileptic attacks. Some of these epileptiform convulsions prove fatal. In such cases there is always the doubt that there may be some other cause of death, but when the attacks cease as the pulse returns to its normal frequency the diagnosis does not seem doubtful. All the slow hearts the author has seen have shown evident signs of dilatation, but they have not usually shown any marked indication of weakness. A heart which beats at an abnormally slow rate does so undoubtedly not because of any change in the condition of its muscular fibres, but because its movements are retarded by an inhibition coming through the vagus. A slow heart does not always give rise to pseudo-apoplectic seizures, and it is not inconsistent with prolonged life and a fair amount of health. A slow heart may pass into the condition of *delirium cordis*. We have but to suppose that the vagus inhibition continues to maintain the auricles at their acquired slow

and regular rate, and that then indulgence in unwonted exercise and excitement cause the ventricles to beat faster, and the irregular and tumultuous action is at once accounted for (Roy). This is a condition readily remediable by appropriate treatment, except in its most extreme form, of which Dr. Balfour can recall only three well-marked examples. Two of these were well-known professional men, who both died from dilated hearts,—one at the age of three score and ten and the other twenty years younger. Of these the elder had the pulse of *delirium cordis* for twenty years before his death. In no inconsiderable number of cases the heart is persistently irregular for years without presenting the extreme form of *delirium cordis*; it sometimes approaches this ideal, but in general the irregularity is only occasional, trifling in character, and apparently quite independent of both exertion and emotion; sometimes, indeed, disappearing under the influence of excitement thus induced, and ceasing suddenly when the heart by treatment gets strong enough to resist inhibitory or other evil influences.

It is of importance to remember that the senile changes in the circulatory system comprise not merely loss of arterial elasticity and diminution of the capillary area by obsolescence (withering) of many of these vessels, but also another alteration of even more significance, too often forgotten and overlooked, but yet a factor in all the future life which can never be neglected.

Reference is made to that remarkable change which takes place about middle life in the relative size of the aorta and the pulmonary artery. Up to this period the pulmonary artery has been the larger of the two, and the blood has thus been kept at a high pressure within the lungs, notwithstanding a free and unembarrassed egress into the left heart, and so onward. But blood circulating through the lungs at a high pressure and a normal rate gets rid of its carbonic acid more rapidly, and, therefore, more perfectly, than blood circulating at the same rate but at a lower pressure. Hence, up to middle life every tissue of the body has been continuously flushed with a highly oxygenated blood, full of potentiality, and a well-nourished and healthy organism has thus been filled full of life and vigor, and placed at its very best in regard to capacity for mental and bodily exertion. After middle life all this slowly changes; the aorta gradually becomes larger than the pulmonary artery; the blood circulates through the lungs at a much lower

pressure than formerly ; consequently, the carbonic acid is given off more slowly, and throughout all the future life there is a gradually increasing venosity of the blood, as the older writers term it, which has an important influence upon all the functions of the body. As age advances, there is also a tendency of the blood in the veins gradually to increase in amount at the expense of that in the arteries, and the slightest disposition to cardiac debility or dilatation is an obstacle to the onward flow, and aggravates this tendency. Thus, after middle life, the blood is continually being shut off from ever-increasing areas throughout the body by withering of the capillaries ; it slowly accumulates in the veins, is more venous in character, less highly oxygenated than formerly, and it is surcharged with effete material. As a consequence, every function of the body is impeded, every secretion deteriorated, and all the organs suffer.

Functional Disorders.—Sir Dyce Duckworth,² in speaking of functional disorders of the heart, considers :—

First. Infrequency. This may occur as a constitutional peculiarity, the pulse not being more than 30 or 40 beats a minute ; also in convalescence from acute disease. If connected with a cardiac lesion, it is apt to be associated with aortic stenosis or fatty degeneration. Malarial poisoning has furnished the most marked instances that have come within the author's own knowledge. Jaundice and cranial injuries or diseases are also causes. Whether the condition is due to inhibitory sympathetic influence or to intensified action of the vagi is not certainly known. Its existence does not necessarily indicate an unfavorable prognosis.

Second. Intermittency. This may be unimportant or it may portend grave cardiac disease. Among the less serious causes are tea, tobacco, overwork, night-work, loss of sleep, anxiety, and violent shock from grief. Intermittency may pass off temporarily under the stress of an acute illness and pyrexia, and return with the re-establishment of health. Dyspepsia not uncommonly causes temporary intermittency, especially in the recumbent posture ; the line of irritation here is through the gastric branches of the vagus.

For purposes both of diagnosis and prognosis in any given case, care must be taken to ascertain the degree of arterial tension present. Speaking generally, it may be affirmed that high-tension pulses with intermittency are of more serious import than the

reverse, such conditions probably being significant of progressive damage to the valves and coats of the aorta.

Again, the supervention of intermission in the pulse after sudden exertion is graver than the abiding condition of intermittency under ordinary conditions. The weak heart fails under stress.

Third. Irregularity, meaning irregularity of rhythm and inequality of tension. This is sometimes a temporary condition due to dyspepsia, emotion, or abuse of tea, coffee, and tobacco. Persistent cardiac irregularity is quite apt to be associated with organic changes in the walls or valves of the heart. Gout may occasion it.

Fourth. Inordinate frequency (palpitation). This may be either temporary or persistent. Dyspeptic disturbance is often to blame for the temporary form. In the abiding varieties there is commonly profound nervous disorder, as in Graves's disease. Paroxysmal varieties have been noted in connection with chronic rheumatic arthritis and with displaced kidney. Paroxysmal palpitation without recognizable disease of the heart occurs in middle life and about equally in both sexes. Rheumatism and syphilis figure as antecedents of several of the recorded cases, and it seems probable that behind the disease there is some organic cardiac lesion.

Fifth. Inordinate vascular pulsation. This is found in the abdominal aorta in conditions of anæmia, although not in leukæmia and pernicious anæmia, and after hæmorrhage due to gastric ulcer. It is also sometimes seen in dyspepsia, hypochondriasis, and oxaluria. The drugs which prove of any avail are such as act especially through the nervous system. Post-mortem, in cases dying from other causes, no gross pathological change has ever been found.

In closing, the author says: "I endeavor to consider only such conditions of cardio-vascular disorder as are, for want of a better term, called functional. There is as yet no morbid anatomy for them, yet for many of them the line is apt to be transgressed, and in time there are found changes in the direction of decay by atheroma and fatty degeneration with fatal issue. Have we not here the earlier manifestations of organic disease, changes, indeed, but such as may often be recoverable, if early detected and wisely treated? To my mind the line of break-down—for such it is—appears to be in the central nervous system."

E. M. Skerritt,²_{Aug. 16} for cases of abnormally frequent pulse,

strongly advises quinine in rather large doses, continued for a long period. He has seen cases of this kind, in which rapid pulse had been succeeded after a time by fullness of the thyroid and exophthalmos, gradually restored to health after such treatment. One of the worst cases of Graves's disease which he had ever seen had under his observation been cured by the occurrence of pregnancy.

Sansom,⁶ speaking of rapid heart without notable morbid association, divides the cases which he has himself observed into two categories: 1. Those in which there was no association whatever with the recognized cardinal signs of exophthalmic goitre. In this division were 46 cases—30 females and 16 males. 2. Those in which there was an association, more or less marked, with the affection mentioned. This division included 29 cases—24 females and 5 males. He regards it in the highest degree probable that the conditions in the two sets of cases are closely allied. This seems to be indicated from the points of view of etiology, consequences, and associations. In both divisions there is strong evidence of the initiating influence of psychical or physical overstrain, or of these causes combined, whilst in both also the condition may develop without such initiating influence. In the one and in the other organic disease of the heart may be manifested, exceptionally. There seems to be no good evidence to suggest the possibility that such structural disease, whether inflammatory or degenerative, is protopathic. On the other hand, there is much to show that it is socondary to the nervous implication. It is clear that the impairment of the myocardium occasioning dilatation of the cavities may be temporary only in some cases. He would interpret the differences between one and the other as differences of extent as regards nervous implication rather than as differences of intensity. In certain cases where the heart rapidity is the only sign of circulatory disturbance the danger to life is extreme.

Samuel West,⁶ discussing paroxysmal hurry of the heart, calls attention to the history in several of the cases of previous syphilis and in others of rheumatic fever. For these and for other reasons he is inclined to the belief that the cases of paroxysmal hurry of the heart are not due to functional disturbance alone, but to an organic lesion, and that that lesion is, in all probability, in the muscular substance. It may be in some cases a form of chronic interstitial myocarditis. In the way of treatment, nitrite of amyl,

digitalis, and laudanum have seemed beneficial, and, in some cases where death seemed imminent, brandy, ether, and ammonia were employed to advantage.

Riegel¹¹⁴_{B, V, H, A, 4} has made 1047 observations where the heart-beat was less than 60 times per minute. Bradycardia may be physiological. It occurs in the puerperal state, in starvation, and as a constitutional peculiarity. When pathological, it is seen: in convalescence from febrile affections,—twenty-five per cent. of the whole number of cases were of this kind; in diseases of the digestive tract (379 cases), and particularly in icterus; in diseases of the respiratory organs (87 cases), as in convalescence from pleurisy, after hæmoptysis, or after the withdrawal of a large pleuritic effusion; in cases of disorders of the circulatory organs (47 cases), as in fatty degeneration of the heart and in sclerosis of the coronary arteries. It was not, however, found to be a constant symptom of any one disease of the heart. Slow heart is seen in diseases of the urinary organs (64 cases); as a result of poisoning (3 cases of lead and 5 of chronic alcoholism); in anæmia (27 cases of anæmia and chlorosis, 1 case of extreme anæmia after lead poisoning, and 3 cases of diabetes); in 93 cases of disease of the nervous system. It was also observed in 17 cases of extreme fatigue and exhaustion, 1 case of sun-stroke, 2 cases of skin diseases, and 17 of painful affections of the muscles.

Unverricht,⁴_{J, 10} in studying a case of mitral regurgitation, observed that at times a peculiar form of allorhythmia occurred, akin to the pulsus bigeminus, but more accurately described by the term of alternating systole. With the first pulsation of the heart was heard a loud mitral systolic murmur; with the second, a clear heart-tone, not a murmur, loudest over the right ventricle. With the first contraction the impulse was strongest over the left side of the heart; with the second, over the right. The diastolic sound with the first contraction was loudest over the aorta; with the second, over the pulmonary artery. Epigastric pulsation was scarcely noticeable, except with the second contraction. A cardiogram, taken in the fifth intercostal space somewhat outside the mammillary line, presented a much higher rise with the first than with the second systole; while the sphygmograph, placed in the third intercostal space over the base of the heart, indicated pulsations of equal strength with both contractions of the heart, or even some-

times a slightly greater rise with the second contraction. We have accordingly the following varieties of allorhythmia: (1) the *pulsus bigeminus*, differing from the ordinary pulse in that the ventricular contractions occur in pairs, with a slight interval between each pair; (2) *hemisystole*, in which, taking each pair of contractions, the right ventricle shares in both, but the left ventricle in the first alone; (3) *systolia alternans*, where the first pulse-wave corresponds to an almost exclusive contraction of the left ventricle, and the second to a similar contraction of the right. The author believes that the immediate cause of the phenomenon under discussion lies in the nervous system, although mechanical conditions, as, for instance, a valvular lesion, may be the remote, prime cause.

Délio,²¹_{May 15} maintains that a continuous gradation in the form of the pulse can be traced from the *pulsus bigeminus* up to complete intermittence. The bigeminal pulse represents one of the most common forms of allorhythmia, and often the so-called irregularity of the heart's action is merely an intercurrent *pulsus bigeminus*.

Ascending Venous Pulse.—A case illustrating this very rare condition was described before the Berlin Medical Society by Benno Holz.⁴_{Dec. 14, '90} A woman, 56 years old, suffering from pseudo-leukæmia and interstitial nephritis, finally had œdema of the lungs and became cyanotic in consequence of a weak heart. To relieve this condition an injection of camphor was given. Half an hour later the pulse became regular, hard, and full. There was no capillary pulse in the finger-tips, which were cyanotic, but there was seen in the well-filled and distended veins of the hands and forearms a strong post-systolic pulse, ascending from below upward; that is, centripetally. It extended only from the tip of the hand to the upper arm, no trace of it being seen in the jugulars. This pulse was plainly visible and palpable, the wave running upward. Constriction of the brachial artery, as well as compression of the peripheral veins, caused it to disappear, while central pressure on the veins had no effect. This phenomena lasted an hour and death ensued on the following day. At the autopsy the heart was found hypertrophied, but without valvular disease. In this case the pulsation was produced by the passage of the strong pulse-wave from the arteries through the capillaries and into the veins.

Quincke,¹⁸¹ however, does not believe it to be so rare as represented, and states that he has seen it many times. The principal condition necessary for its appearance is relaxation of the blood-vessels, more especially of the arteries; but it requires also dilatation of capillaries and veins, as that which accompanies certain stages of fevers when there are sudden crises with sweating. Thus, he has seen it in typhoid, relapsing, intermittent; pyæmia, polyarthritis rheumatica, pneumonia, phthisis, and gall-stones. Nervous influence might be present, along with fever, in cases of meningitis, spondylitis, encephalo-malacia, and cervical injuries. It may be observed, likewise, in apyretic states,—chlorosis, traumatic anæmia, and cancer,—as well as in the healthy, if the summer heat has induced relaxation of the peripheral vessels. The phenomenon is observed on the back of the hand and forearm only; but once only did Quincke see it in the veins of the dorsum of the foot. Besides the above, other conditions are essential,—softness of the skin, powerful heart's action, producing a sufficiently high pulse-wave and a certain medium degree of filling of the veins. The pulse easily disappears, mere change of position being sufficient to efface it. The presence of a centripetal venous pulse does not necessarily indicate that a capillary pulse must also be visible; perhaps a direct continuity of artery and vein may explain this. The transmission of the pulse-wave into the veins is the more likely, the greater the pressure difference between the cardiac systole and diastole. In the extreme arterial relaxation of the later stages of fever this is most marked, as also in aortic regurgitation. It may be favored, moreover, by arterio-sclerosis (Senator), and retarded by venous stagnation (Holz). For the occurrence of the visible capillary pulse and the centripetal venous pulse we have, in common, the height and rapidity of the pulse-wave, and, in addition, there is necessary for the latter extensive relaxation of the large arteries and veins.

Causes of Cyanosis.—In cases of congenital heart disease two theories have been advanced as to the causation of cyanosis: one, suggested by Morgagni, that this condition is due to general congestion; and the other, by Hunter, ascribing the appearance to the intermixture of the venous and arterial currents of blood. The present tendency of writers seems to be that the former theory is sufficient to explain all cases. This view is strongly opposed by

Bard and Curtillet.⁹² These observers, in a large number of autopsies made during the past year at the Saint-Pothin Hospital, have found that the persistence of a patent foramen ovale is by no means exceptional, may be met with at all ages, and that it is compatible with a long existence without cyanosis or apparent symptoms of cardiac affection. This immunity from cyanosis is explained in many cases by the oblique direction of the interauricular opening, which acts as a valve to prevent the passage of venous blood from the right side to the left. In other cases the valve of Vieussens may persist in a form which will accomplish the same result. Cyanosis is produced only when the venous blood from the right side of the heart passes over to the left side and mixes with arterialized blood. As the pressure in the left auricle and ventricle is always higher normally than on the right side of the heart, the blood-current is directed to the latter when there is an open foramen ovale or defective interventricular septum. If the blood-pressure is equal on both sides of the heart almost no mixture of blood will result, although there may be a free opening, and no cyanosis will be produced. On the other hand, if a considerable amount of blood passes from the right to the left side, cyanosis will always be caused, according to these observers. Intermittent cyanosis is thus explained by changes in the relative amount of blood-pressure in the two sides of the heart, the cyanosis appearing when the higher pressure is on the right side, and this condition is generally due to obstruction in the pulmonary circuit. In some cases the cyanosis is caused by venous stasis and mixture of blood at the same time. It may, of course, be due to venous stasis alone.

These observers report 2 cases in which there was a large interauricular passage. In the first case the passage was oblique, and of such a nature as to be kept closed by the higher pressure in the left auricle, which was maintained through life by a marked stenosis of the mitral valve. There was never any cyanosis. In the second case cyanosis did not appear until the age of 54, when a pulmonary affection raised the blood-pressure in the right auricle sufficiently to force blood through the patent foramen into the left auricle. As an example of cyanosis, caused by mixture of venous with arterial blood, a case is cited which was reported by Lavergne in 1889. A child aged 9 years had well-marked cyanosis from

birth. On any exertion the cyanosis became deeper and the respiration difficult. At the age of 10 years the condition of asystole was developed, together with œdema and other evidences of venous stasis. At the autopsy there was found entire absence of the interventricular septum. From this ventricular cavity only one large artery arose, and this bifurcated to form the aorta on the left and the pulmonary artery on the right. The observers consider this case conclusive, as they find no evidence of venous stasis sufficient to cause cyanosis until the age of 9 years.

In opposition to this theory of cyanosis being caused by the mixture of venous with arterial blood, is a case of Breschet, in which the left subclavian artery arose from the pulmonary artery, and yet there was no difference in the development or color of the two limbs.

A very interesting case is also reported by Carpenter, of London.⁴¹⁸
v. 18, p. 288 A child aged $5\frac{1}{2}$ years was admitted to the Evelina Hospital. Up to the age of $2\frac{1}{2}$ years he had good health, and showed no cyanosis or dyspnoea even when running about. He then had an attack of scarlet fever, after which the signs of cardiac disease appeared,—cyanosis, often intense, and marked clubbing of fingers and toes. He died at the age of $7\frac{1}{2}$ years, and the autopsy showed hypertrophy, especially of the right side of the heart, rudimentary pulmonary artery, a large opening in the ventricular septum. From the arch of the aorta were given off large vessels which entered the lungs. This child was, to all intents and purposes, provided with one ventricle only, and the venous and arterial blood must have been of necessity mixed; yet there was no cyanosis for two and a half years. In this case great enlargement of the capillary vessels in the lungs and elsewhere was found, and the cyanosis was evidently produced by general venous stagnation.

Another rare case is reported by Chapotot.²¹¹
Dec. 70 A child aged 20 months died of double pneumonia. There had never been any cyanosis. At the autopsy the following condition was found: There was no tricuspid opening at all, but complete separation of right auricle and ventricle; a free communication between right and left auricles; a small opening in the interventricular septum, close to and leading up to the pulmonary artery; the ductus arteriosus was closed. The aorta and mitral valves were normal. In this case there was a free intermixture of arterial and venous

blood in the left ventricle. At each systole the left ventricle drops a part of its mixed contents through the interventricular septum and into the pulmonary artery. A sufficient amount of blood was thus oxygenated, and there was no venous stasis in the larger circulatory system.

These cases prove that a thorough mixture of blood may take place in the left ventricle, and cyanosis will not result unless there is deficient aëration of blood in the lungs,—a condition usually due to general venous stasis, but which may be produced by stenosis of the pulmonary artery without venous stasis in cases where an open foramen ovale or incomplete interventricular septum prevents overdistension of the right side of the heart.

A rare condition simulating cyanosis has also been observed in which the dark coloration of the integument was probably due to some alteration of the blood. In such a case microscopical examination of a drop of blood will show a brownish color of the serum.

Distribution of Dropsy.—F. C. Shattuck⁹⁰ comments upon the “irregular and apparently capricious distribution of dropsy in many cardiac cases.” In one case there may be pulmonary oedema, hydrothorax, and congestion of the abdominal viscera, without ascites or anasarca. In another case the serous sacs, the internal viscera, and the skin are all the seat of dropsy at the same time; without an apparent reason why, in one case, there should be a uniform, and in another an irregular, distribution of the dropsy. “It is probable that no individual possesses everywhere an equal integrity of tissues and organs, and his visceral development is, perhaps, as irregular as is that of the muscles.”

Digestion in Heart Disease.—A. Adler and R. Stern^{4, 91} have made an investigation with regard to the digestive power of the stomach in heart disease. Twenty patients with typical cases of cardiac disease were examined, 15 of them repeatedly. Only 1 failed to present free hydrochloric acid in the contents of the stomach one hour after the trial breakfast (Ewald) had been ingested. In about half of the cases the motor sufficiency of the stomach was tested by the salol method. The conclusion reached was that the organ in these patients with heart disease did not differ essentially from the stomach of healthy persons. It is not denied that chronic congestion of the stomach may

lead to catarrh, and thus indirectly to a lowering of the secretory functions of the gastric glands, but it seems probable that in at least a part of the cases the gastric symptoms are referable to some central cause. These results are contradictory to those of E. Hufler,³⁴ the explanation being that the latter examined the stomach either too soon or too long a time after the test-meal had been given. Max Einhorn, of New York,⁴ after examining 12 patients, arrives at the conclusion that "heart disease does not exercise any influence tending to diminish the acidity of the gastric juice." Where gastric symptoms present themselves in case of cardiac lesions, they are to be regarded as the result of gastric catarrh, secondary to passive congestion of the mucous membrane.

Sputum in Heart Disease.—Hermann Lenhartz⁶⁹ describes certain cells seen in the sputum of patients with heart disease. These cells, which have also been described by Hoffmann,³²⁶ and Sommerbrodt,⁴ are found especially in the more strongly tinged portions of the sputum, and are described as either nucleated or unnucleated, in size ranging from the diameter of a white blood-corpuscle to five or six times as great, some of them more or less yellowish, some of them light colored, and almost all of them containing fine and coarse grains of pigment, but no hæmatoidin crystals. The author agrees with Hoffmann that these pigmented cells are characteristic of the brown induration of the lung caused by heart disease, being found exclusively in this condition. They are most of them round cells which have absorbed blood-corpuscles into themselves, although some few originate from the alveolar epithelium.

Prognosis in Cardiac Disease.—Germain Sée,⁸¹ in a careful review of this subject, shows how great a change of opinion has occurred in regard to the prognosis in cardiac disease. In the early part of the century both physicians and patients thought that every individual whose heart was affected was condemned to certain death, and was in constant danger. Toward the middle of the century this view was much modified under the influence of Stokes and others.

Recently, Sir Andrew Clark has reported more than 100 cases of valvular disease, which he has watched for periods of five years or more, and in which no disturbance of function has occurred. On the other hand, sudden death frequently occurs in persons

apparently but little affected. Still, in reviewing all the facts, we must conclude that sudden death is much less frequent than has been supposed. He agrees with Leyden, who says in a recent article that there are only two forms of cardiac disease which are liable to a sudden fatal termination: first, aortic insufficiency, and, second, true angina pectoris. In the first class of cases death occurs from embolism of cerebral arteries or from rapid failure of compensation. In the latter class, when associated with arterio-sclerosis, sudden death follows the invasion by the disease of a vital centre in the heart, or is caused by thrombosis or embolism of a coronary artery. It is impossible to foretell, either by its duration or intensity, whether a given attack will be the last. The first attack may be fatal. In other cases, after six months or one or two years, the paroxysms may become milder and less frequent, and, while a cure is hoped for, an unexpected fatal attack occurs. In other cases the fatal ending may come gradually, the same as in valvular disease. In mitral lesions scarcely 2 per cent. of the cases end in sudden death, and in these cases it is the physician's duty to relieve the patient's mind of such apprehension. In fatty degeneration of the myocardium, also, sudden death may occur, and this condition is generally associated with sclerosis of the coronary artery.

It is noteworthy that sudden death is more common among those whose symptoms are the least alarming, or who, as in angina pectoris, suffer from occasional attacks, but in the interval are in apparently perfect health.

Such cases should be carefully instructed in regard to hygiene and habits. A true statement of their danger, far from shortening their lives, as is feared by short-sighted sentimentalists, will prolong their lives by making them see the necessity for strict observance of the rules of hygiene.

F. P. Henry,¹_{Dart., 30} in speaking of the prognosis of valvular heart disease, takes occasion to say: "In my opinion the present tendency is to encourage patients with heart disease to overexertion. They are not sound, vigorous individuals; and, although they should as far as possible keep themselves from brooding over their ailment, they should also never completely forget its existence. The only exercise in which they should indulge to any great extent is walking. Any exertion which involves much use of the arms, such as rowing, is injurious; and tennis, base-ball, or swim-

ming is suicidal. The latter is true of cold bathing, and probably the most injurious combination possible is swimming in cold water."

TREATMENT.

Pepper,⁷⁴_{Sept., '90} in a clinical lecture reported by E. C. Ellett, gives an admirable *résumé* of the treatment of valvular heart disease.

As there is great liability to acute intercurrent attacks of endocarditis, any rise of temperature, with pain, tenderness, and tension of the vessels, demands rest, mild depletion, mercurials followed by absorbents, counter-irritation, etc., in the hope of preventing any addition to the valvular lesion. If, however, there are no acute symptoms, the problem becomes, as it were, a mechanical one, and the patient's life must be adapted to the capabilities of his weakened heart. Excitement and emotion must be avoided. Light, graduated exercise must be employed to improve the general muscular system. The diet must be studied from the same stand-point,—of the force it gives in proportion to the force it takes. No absolute rules can be laid down. Increase of fat-tissue should be avoided, nor should a diet favoring plethora be used, as vascular tension is thereby increased to the aggravation of the lesion. The bowels should be kept in easy action, not constipated nor yet too loose. If this can be done by habit and diet medicines should be avoided. An occasional blue pill, followed by a mild saline laxative, will be found of benefit when a tendency to internal congestion manifests itself. The nutrition must be carefully watched and assimilation promoted by such remedies as iron and codliver-oil. As long as there is any hope of obtaining a diminution in the existing lesion by absorption, and especially in the young, we should try the effect of iodide of potash, with or without bichloride of mercury. If the heart is excited and strong, aconite, veratrum viride, and a bromide may be given. In anæmic patients with strong hearts, give iron with a bromide. If the heart be excited, but weak, digitalis is indicated. No one form of valvular disease more than another calls for this drug, nor is the mere presence of a valvular lesion an indication for it. It is best to begin with small doses, five drops of the tincture of digitalis, and continue it till the desired effect of slower, more regular, and stronger pulse is attained. It is usually necessary to give it a long time, but when it has succeeded in establishing compensation it

should be abandoned. The alkaloid is not as reliable as preparations of the whole drug. Convallaria, caffeine, strophanthus, hydrocyanic acid, Hoffman's anodyne, or one of the nitrates may succeed where digitalis fails; but they are generally inferior to it.

Disturbance of the stomach has so bad an effect upon the heart that drugs should be dispensed with as soon as possible, and our reliance placed on hygiene.

Many complications of heart disease are benefited very much by simple rest in bed.

Treatment of Weak Heart.—W. A. Hammond²⁰ gives a summary of his experience in the treatment of weak heart, by which he means simple weakness of the muscular structure or defective innervation apart from valvular disease.

In regard to digitalis, he does not believe in what is called the cumulative effect of this drug as an event likely to occur from even the long administration of the agent. On the contrary, digitalis requires to be given in increasing doses, if we desire to obtain the fullest possible benefit from its therapeutic influence. The neglect of this plan frequently leads to disappointment. Beginning with 2 drachms (8 grammes) of the infusion or $\frac{1}{8}$ grain (0.002 gramme) of digitaline, he increases the dose about one-fourth in a week or ten days, and after a second period of the same length he increases the dose again. After a considerable experience with convallaria, he states that it cannot be compared with digitalis as a heart-tonic. It is uncertain in its action and scarcely deserves to be considered as a medicine capable of giving strength to an enfeebled heart. He has been invariably disappointed in its use. In doses of 30 drops of the tincture hardly any effect was produced. It does not increase the force of the cardiac pulsations, nor does it lessen their frequency. Strophanthus is a far more valuable remedy, though even this agent is not comparable to digitalis. It might be administered to patients who cannot bear digitalis, but Hammond has never met with a case where there was absolute intolerance of digitalis. It appears to him to bear the same relation to digitalis that brucine does to strychnine. When administered as a heart-tonic it should be given in much larger doses than those ordinarily prescribed. Strychnine has been of great benefit. It is to be given in gradually-increasing doses until some indication of the physiological action of the drug is obtained. This usually consists of a slight

rigidity of the muscles of the neck or calves of the legs. The administration is then stopped for a day or two and then resumed as before. The writer is quite sure that he has frequently succeeded in giving tone to weak hearts when even digitalis has failed to produce permanently beneficial results.

Within the last few years Hammond has made great use of cocaine as a heart-tonic. Its action in this respect is readily perceived by the stethoscope, the sphygmograph, and by feeling the pulse. Moreover, its influence is markedly shown in the ability which it gives the patient to take increased exercise without suffering from dyspnoea or inordinate cardiac action. He usually begins the administration with a dose of $\frac{1}{4}$ grain (0.01 gramme) three times a day, and gradually increases this in the course of a month up to 1 grain (0.07 gramme). It is well to give it in combination with wine. In some cases it is not advisable to increase the dose. Cocaine, more than any one medicine with which he is acquainted, appears to possess the property of exhibiting its effect without an augmentation of the dose, and in such cases the original quantity may be continued indefinitely without deleterious effects, but, on the contrary, usually with marked beneficial results.

No medication can be relied on to produce permanently beneficial results. Treatment should include the use of physical exercise and diminution of the amount of liquid ingested.

Digitalis.—A. L. Loomis,¹⁸⁹ dwelling upon the use of this drug in cardiac diseases, holds it to be the most reliable of all the so-called heart-tonics; "yet there is no other drug which requires so much skill in its administration." Idiosyncrasy is always an important factor in this question. The drug should be administered as soon as the beginning of heart-failure is manifest. The best results are obtained from small doses; for example, only 1 or 2 drops of the tincture. The ingestion of more digitalis than is requisite to overcome the insufficiency does positive harm. When the drug is given in doses of more than 5 or 10 drops of the tincture, the patient should be at rest. Hence in early stages the author is accustomed to give a single dose at bed-time. When large doses of digitalis are given for a length of time, active exercise becomes dangerous. If the patient is in a water-logged condition, and the administration of digitalis increases the quantity of the urine, the drug is doing good; and the dose is to be increased, if possible, up

to the point of securing compensation ; but if the quantity of urine be diminished, its action is not beneficial, but positively harmful. In the early stages of fatty degeneration, or in cases of simple weakness of the myocardium from insufficiency of the blood-supply or from general muscular debility, digitalis may strengthen the heart ; but if the degeneration be due to a fibroid condition, the relief will be very temporary, and the patient be ultimately worse than at first. Here mercury and iodide of potash will be found serviceable. As to the form of the drug to be chosen, the tincture is suitable whenever a simple tonic effect is desired, and the infusion when the object is to produce diuresis. In giving large doses for heart insufficiency the infusion is preferable.

Administration of Remedies.—Gauthier ⁶⁵⁰_{may be} has been studying the mode of administration of cardiac remedies. The best form in which to administer digitalis is that of an infusion, made by macerating the digitalis-leaves ; and, when time permits, it is this preparation which should always be used, as it gives the most prolonged and intense action, and is most efficacious in producing diuresis. The infusion should be given in gradually-increasing doses. Digitaline is by no means a constant preparation, nor does it possess all the properties of digitalis-leaves. Nevertheless, crystallized digitaline is of use where rapid action is desired, although ordinarily its action is too intense and therefore dangerous ; while its subcutaneous use is extremely painful and liable to be followed by abscesses. Convallaria is also best employed in the form of a maceration, 8 or 10 parts being macerated in 1000 of water, to which syrup may be added, and employed the day in which it is made. Its active principle, convallarine, may be employed in doses of $\frac{1}{4}$ grain to $1\frac{1}{2}$ grains (0.01 to 0.03 gramme). Strophanthus is best employed in the tincture, the one officinal in the English Codex being the best, in 5-drop doses three times daily, although 10 to 20 drops may be given once or twice in the twenty-four hours in a single dose. Adonis may be employed in the form of an infusion or decoction, or its active principle, adonidine, may be given. The infusion seems to be inconstant in its activity, and both of the watery preparations have an extremely bitter taste. Adonidine may be given in a dose of $\frac{1}{4}$ to $\frac{1}{2}$ grain (0.01 to 0.02 gramme) in twenty-four hours. Its toxic action is ten times that of digitalis. Caffeine is a reliable remedy, provided it is given in sufficient dose,

ordinarily 15 to 30 grains (1 to 2 grammes) being required. This dose should, however, not be exceeded without care, as in larger quantities it is not free from danger. The salts of caffeine are nearly insoluble in water, and they are unsuited for subcutaneous injection, although the double salt, the benzoate of soda and caffeine, is an exceedingly valuable preparation. Sparteine may be employed either in the form of an infusion or decoction of scoparius, or as sulphate of sparteine. The alkaloid is especially valuable for its action on the heart, in doses of $\frac{1}{4}$ grain to 4 grains (0.05 to 0.25 gramme), while the infusion is endowed with more diuretic power.

Cactus Grandiflorus.—A. O. Jones, of Harrogate,² communicates a report of his experience with cactus grandiflorus. This plant is a native of Jamaica and Vera Cruz. It is possible that other plants of this order may be equally valuable, for Robert Bentley in his work on botany states that the fruit of many species is useful in febrile diseases. Four cases are reported, 2 of cardiac weakness without a murmur and 2 of mitral disease, and in all 4 the results were gratifying. J. E. Engstad, of North Dakota,⁸⁰ having used cactus grandiflorus in heart troubles to a considerable extent for the last four years, finds it especially valuable in febrile disorders.

Coronilla.—Schlagdenhauffen and Reeb have investigated the physiological action of extract of coronilla upon animals, and Cardot the therapeutic effect of the drug in heart disease of the human subject. The following are the conclusions reached by the experimenters¹²¹: 1. As these preparations are heart-tonics, they favorably influence certain symptoms resulting from failure of the heart's power. 2. When beneficial effects are produced they appear within a short time (twenty-four to thirty-six hours) after beginning the use of the drug; do not increase from its further administration, and rapidly disappear after its suspension. 3. The effects consist in an increase in the volume of the pulse, in diuresis, decrease of the oedema, and relief of the dyspnoea. 4. The remedy is powerless in those cases in which digitalis fails, namely, degeneration of the muscular substance of the heart. 5. It is efficacious in the cases in which digitalis also succeeds. 6. In several cases the use of coronilla was attended by unpleasant consequences, such as vomiting and diarrhoea.

Influence of Temperature and Quantity of Ingested Water.—Strickler and Friedrich¹¹³_{Oct. 12} have made numerous experiments upon both healthy persons and the subjects of heart disease with regard to the influence of the temperature and the quantity of ingested water upon the heart. Their conclusions are as follow: 1. The influence of the temperature of the water ingested is evident at once after it is drank. 2. Cold water diminishes the pulse-rate and raises the blood-pressure. Very cold water, however, often diminishes the blood-pressure. 3. Warm water quickens the pulse and raises the blood-pressure. Lukewarm water usually lowers the pressure. 4. The colder or warmer the water, so much sooner is the maximum effect produced, and so much longer does the influence last, having a maximum of fifteen or twenty minutes. 5. In the subjects of heart disease it takes longer for the diseased heart to return to its original action, and the disturbances of the heart's action are much more intense than in health.

Treatment of Dyspnœa.—Huchard,³_{Aug. 18} in a clinical lecture, says that the dyspnœa of heart disease may arise in three ways: first, as a direct result of the cardiac lesion, where it may be due to a disturbance of the cardiac nerves or to impairment of the pulmonary circulation, and yet no pulmonary lesions be made out upon auscultation; or, secondly, as a purely mechanical affair, whether in the way of pulmonary apoplexy, bronchitis, hydrothorax, or œdema; or, finally, the result of auto-intoxication from impaired renal activity. For this last variety of cardiac dyspnœa, the renal, Huchard employs an exclusive milk-diet for ten or fifteen days, the dietary being later increased by the addition of gruel made with milk, eggs, and vegetables, and finally of meat. Pork is found to contain the least amount of ptomaines, and no meat should be given that has been kept at all long. Antiseptic remedies may be given internally, such as naphthol, salicylate of bismuth or magnesia, charcoal, salol, and in an extreme case bleeding may save life. Digitalis and other toxic drugs are to be avoided because of the faulty renal elimination; although, after the patient has been for some days upon a milk diet without relief, it may then be advisable to resort to digitalis once more.

Massage of Heart.—Oertel,⁵⁷_{Dec. 22, '90} in a work upon massage of the heart, states that during expiration pressure should be made by the hands upon the thorax in the axillary line, beginning at about

the fifth or sixth rib, and, as expiration proceeds, moving gradually downward and forward to the xiphoid process, in the neighborhood of the seventh or eighth rib. In this way a lateral pressure is applied to the chest-walls, and at the same time the two thumbs placed on each side of the sternum tend to narrow the antero-posterior diameter of the thorax, or, at least, to prevent its increase during expiration. The benefits of this process are referable not merely to its influence in perfecting the act of expiration, but also to the direct pressure upon the heart, influencing its nutrition precisely as massage benefits the muscles of the extremities. This treatment is indicated : first, where the heart-muscle is weak, either from deficient nutrition or anæmia, or corpulence ; second, where the arterial system is imperfectly filled and there is passive congestion, particularly as a result of insufficiency of the myocardium ; third, where valvular lesions or obstructions to the circulation, the pressure of tumors, constriction of the pulmonary circulation, emphysema, or curvature of the spine, increase the demands upon the heart ; and, fourth, and most important, as an accompaniment of the mechanical treatment of the heart by mountain-climbing. It is contra-indicated in all cases in which any mechanical treatment of the heart is contra-indicated, namely, in acute or recurring endocarditis or pericarditis ; second, in acute and subacute myocarditis resulting from sclerosis of the coronary arteries ; and, thirdly, in general arterio-sclerosis.

Mechanical Treatment.—S. S. Salaghi, of Bologna,⁴_{Sept. 15} has devised a mechanical treatment for organic heart disease, the satisfactory result, he says, of seven years of uninterrupted study and effort. The apparatus is not described in detail, but essentially it acts by communicating rhythmical impulses to the blood-current in the peripheral vessels. Relief is felt immediately, and improvement continues with each sitting. The treatment is also advantageous in cases of pulmonary emphysema and after the evacuation of pleuritic effusion, in various forms of dyspepsia, and in constipation.

Cauterization.—Notta²⁰⁸_{Dec. 1, '90} reports 8 cases of cauterization for valvular heart disease. He claims that a cure or notable relief may be obtained by the application of one or several cauteries in the intercostal space corresponding with the point of maximum intensity of the murmur, the chance of a cure being proportionate to the promptness of application after the first appearance of the malady.

DISEASES OF THE MOUTH, STOMACH, PANCREAS, AND LIVER.

By J. P. CROZER GRIFFITH, M.D.,

ASSISTED BY

CHAS. W. BURR, M.D.,

PHILADELPHIA.

DISEASES OF THE MOUTH.

Xerostomia.—This rare disease was first described, according to Hugo Summa,⁹⁸ by an anonymous writer.⁹⁰¹ In 1868 Jonathan Hutchinson presented a similar case to the Neurological Society of London under the name of "dry mouth." This is the chief symptom, and may prevent speaking or swallowing. The tongue looks like raw beef and is cracked like alligator-skin. Sometimes there are no papillæ on the anterior part, but the circumvallati are distinguishable. Common sensation is unimpaired, that to taste reduced on account of the dryness. The salivary glands are normal in size. The cause must be some disorder in the nervous system. Summa also reports a case in a woman of 30; he advises pilocarpine in $\frac{1}{16}$ -grain (0.0043 gramme) doses several times daily. Arctander³⁷⁵ also reports a case in a woman of 44 years.

DISEASES OF THE TONGUE.

Neuroses.—W. B. Haddin,²⁵ describes several cases of distressing obstinate subjective sensations in the mouth in women, beginning in middle life. There is burning of the tongue, extending sometimes to the lips and the roof of the mouth; no objective signs. Cases with symptoms similar to the above have also been recorded by G. Piotrowski.⁵⁰⁰ Personati,¹³⁶ reports a case of tonic spasm of the hypoglossal nerve, with ptyalism and excessive thirst.

Inflammations.—P. Michelson,⁴ reports 3 cases of Möller's glossitis superficialis. Though bothriocephalus is sometimes present in this condition, he thinks no causal relation has been proven.

He⁴_{Nov. 24} also reports a case of glossitis papulosa acuta. Weisenberg²⁹⁷_{Nov. 1; Oct. 26} relates a case of aphthous stomatitis caused by tainted milk. A microbe was isolated from the milk, but no conclusion reached as to the relation in which it stood to the disease. C. Mittenheimer⁴¹_{Mar. 4} has an article on aphthous stomatitis, and recommends silver-nitrate treatment. Nokalai⁵⁸¹_{Nov. 1, 4, 5, 7; Aug. 11} gives an account of an epidemic of ulcerative stomatitis and pharyngitis. A case of gangrenous stomatitis is reported by Brücke.⁴²_{Sept.} It followed rheumatism and cholera nostras, appeared first behind the upper incisors, and ended in death from septic poisoning. W. P. McDonald⁸²_{Nov. 22} and Albert B. Galloway²³_{Oct.} also report cases. Allen McCullough²_{May 10} reports a case of idiopathic glossitis, for which he recommends incision. Charles H. Knight⁵⁹_{Aug. 20} gives an account of hemiglossitis phlegmonosa in a boy of 14 years, in whom the condition seemed largely due to starvation and privation. There was also much submental swelling. The abscess ruptured and recovery followed. One case of buccal gonorrhœa following buccal coitus is reported by Cutter.¹⁰⁷_{June} Microbes resembling gonococci were present, and the man was suffering from urethritis. Complete cure followed applications of subnitrate of bismuth and glycerin and solutions of chlorate of potassium.

Tumors. — E. Mercier¹⁹⁷_{Apr.} reports a case of recovery after removal of sarcoma. Charles N. David⁵⁹_{Nov. 12} had a patient with tubercular ulcer on the middle of the dorsum. The disease had first shown itself by an anal fistula two years before. The symptoms of general infection were severe. J. Toison,²²⁰_{Oct. 1} in reporting a case of secondary tubercular ulcer, says that rapid local cure may be obtained by operation if position permits. Cerné¹¹_{Aug.} showed a specimen of atrophic cancer from a woman of 70 years. The organ resembled that of a paroquet. Michelson⁴_{Nov. 17} gives a case of lupus. James Berry²_{May 24} showed to the London Pathological Society a fibrochondroma removed from a man 49 years old. Unlike most such growths, it was not congenital. Paul Hyman⁴¹_{Apr. 2} exhibited before the Berliner Medicinische Gesellschaft a boy of 6, of poor development and imperfect speech, in whom a lipoma about the size of a walnut had only been discovered a few weeks before. M. V. Bastian²⁸⁸_{Sept. 14} reports for Charin a benign growth in a child of 8 years. H. Mollière²¹¹_{Nov. 22} describes a case of atresia in a man of 40 years, which had existed from early infancy. There was no history



Fig.1. Tongue seen from above.



Fig.2. Tongue seen from below.



Acute Hæmorrhagic Glossitis (Mygind).

From Report of Corresponding Editor.

of syphilis. L. Tripier²¹¹ operated successfully on a case of this kind.

Acute Hæmorrhagic Glossitis.—Our corresponding editor, Holger Mygind,¹¹ of Copenhagen, sends us a report of an instance of the above affection and claims that it is the first on record. The history is briefly as follows: The patient was a married shopkeeper, about 48 years old and childless. His health had always been good except occasional rheumatic pains in the shoulder and hip joints. He had, however, had several slight attacks of delirium tremens and suffered at times from severe frontal headache. Once he had vomited blood. Venereal disease denied. There were no bleeders in his family. He rose in the morning perfectly well, but soon began to feel poorly and began to have rigors with consequent heat and perspiration. There were then no local symptoms arising from mouth or tongue. Later, he went to sleep, and on awakening found blood about the nose and mouth, and vomited bloody matter. Pain and swelling appeared in the tongue, and it became dark in color. There was abundant secretion of viscid saliva and mucus. His appearance was pale and frightened. Examination gave the following results: Teeth about one-half inch apart to make room for the swollen tongue, which, however, does not protrude beyond the lips, and which can be moved from side to side and protruded, but not without difficulty. (The drawings taken from nature on the third day show the tongue more protruded and more rolled up than was really possible, but these deviations from the fact were necessary in order to make the drawing comprehensible.) The swelling was most marked on the right and there was a deep gutter in the position of the septum. The free edge was smooth. The upper surface was blue, except a margin on either side about 1 to 1½ centimetres wide, which was normal in color. The tip also was normal in color. The blue color extended as far back as could be seen and was not distributed evenly, but in darker longitudinal stripes, alternating with pale ones. The epithelium was colorless. On the under surface the effusion of blood had more the appearance of an ecchymosis. The mucous membrane from the tongue to the floor of the mouth was normal, while that in the floor of the mouth was swollen. The papillæ sublingualis were markedly prominent. There was no solution of continuity. Nose was normal. No swelling of glands about the

jaw. Temperature, 38.7° (Celsius) in rectum. Pulse, 100 and weak. Respiration, 16. Abdominal and thoracic organs healthy. No œdema, nor subdermal effusion of blood. Urine acid; specific gravity, 1020 and strongly colored with red urates, which disappeared on warming. Albumen present. Later, delirium appeared and patient saw constantly black kittens, chimney-sweeps, etc. Tremor also appeared and ulcerations on the tongue. The sickness lasted eighteen days and ended in recovery.

That the inflammation was hæmorrhagic is shown by the effusions of blood appearing according to anatomical relations on the upper and under surface of the tongue and in the floor of the mouth. That it was not a case of simple hæmorrhage is proven by the fever, general malaise, and albuminuria, by the swelling being equally developed in places where there was no hæmorrhage, by the absence of traumatism and external bleeding. Little can be said as to etiology, as is the case in most instances of acute glossitis. The hæmorrhagic character is probably due to fragility of the blood-vessels from chronic alcoholism.

DISEASES OF THE STOMACH.

Ulcer.—McCall Anderson²_{Nov. 10} obtained the following results from a clinical study of 35 cases, only 3 of which were men: The disease is one of adolescence and middle life; it is more chronic in males than in females; burning or gnawing pain, coming on after eating, is characteristic, and there is usually epigastric tenderness; vomiting and constipation are frequent; chlorosis is a very common complication. There was only 1 death, and that from hæmorrhage. Talma¹¹⁴_{Nov. 10} made a series of experiments with a view to determine the cause of ulcer. He reports 3 cases in which, almost certainly, painful tonic contraction of the stomach-wall was the cause of hæmorrhage and consequent ulceration. In rabbits this spasm could be produced by irritation of the left vagus, and ulcer would follow, caused by the anæmia from pressure. He thinks that hyperacidity often causes irritation of the vagus and spasm. Rosanow⁵⁸⁰_{Nov. 7} describes a case, specific in origin, of eight years' duration, and cured by potassium iodide and calomel. M. Loeb²⁴²_{Nov.} records a case of dilatation from pyloric ulcer, in which tetanic convulsions preceded death four days. He believes the convulsions to have been caused by infection from decomposed matter in the

stomach, the poisonous substances acting on the central nervous system. Mouisset ²¹_{Aug. 10} attempted laparotomy after perforation had occurred and peritonitis had set in, but the patient died during the operation. Armstrong ²⁸²_{July} stated to the Montreal Medico-Chirurgical Society that he had performed abdominal section for peritonitis from supposed appendicitis. Patient died in seven days, and at autopsy ulcers were found on the two walls, with cystic ovary undergoing gangrenous change. Barton ²_{May} reported to the London Clinical Society, April 25th, a case with symptoms of ulcer, peritonitis, abscess bursting into bowel, and recovery. Faidherbe ²²⁰_{Aug. 3} reports a case of latent ulcer situated on the posterior wall, and A. E. Godfrey ²_{July} one that was latent till perforation and peritonitis occurred. Kernig ²¹_{Aug. 9} also gives a case, the only characteristic symptom of which was hæmatemesis. Poikilocytosis and microcytosis were present. Debove and A. Remond ¹⁰⁰_{Oct. 28} have made a collection of cases of subdiaphragmatic abscess from ulcer and report a case of their own cured by opening and draining. James H. Dunn ¹⁰⁵_{Mar. 16} had a similar case which in life was diagnosed enlarged spleen with abscess and left pleurisy with effusion. Ludvig Hektoen ⁷⁷⁹_{Dec. 79} reports the simultaneous perforation of three ulcers, and Decow ¹³⁰_{May} showed to the Medico-Chirurgical Society of Montreal a case with several ulcers, only one of which perforated. James Ritchie ³⁶_{Nov.} found sarcinous material absent from the vomit after starchy and saccharine food was stopped. The patient was conscious of the passage of food into the intestine by pain and gurgling. Rosenheim ⁸⁹_{Apr. 10} refers to ulcer as a cause of pernicious anæmia. Kernig ²¹_{Aug.} speaks of its rarity among Russians.

In Lenoir's ⁷_{Nov. 11} patient the abscess penetrated the diaphragm and occupied a part of the left pleural cavity, invading the lung.

S. W. Sanford ¹⁶¹_{Nov.} reports the following remarkable case. A child of 10 months swallowed a broom-straw. An abscess formed over the stomach, and upon lancing it the straw worked its way out. Sidney Martin ²_{Nov. 20, '98} relates a case of pyloric ulcer, with an epigastric systolic thrill. Post-mortem a duodenal ulcer was also found and the stomach was full of liquid. The pulsation and thrill are accounted for by the aorta pulsating against the stomach filled with liquid. Christopher Heath ²_{Nov. 20, '98} remarked that a similar case had been sent to him with the diagnosis of abdominal aneurism. Karczynski and Jaworski, ⁵⁸⁹_{Nov. 28} from an examination of cases,

hold that the urine in ulcer grows less as the acidity of the gastric juice becomes greater, and also that it becomes less acid or even alkaline. The chlorides also decrease or entirely disappear. These are bad prognostic symptoms.

Cancer.—Dujardin-Beaumetz ⁹⁷_{Sept. 15} maintains that the forms of cancer and their clinical histories are so unlike as to make it difficult to place them under one head. All cases so diagnosed in children have probably been mistakes. Cancer may occur around an ulcer or follow chronic gastritis; it may be latent. Absence of hydrochloric acid is of secondary importance, and the decrease of the elimination of urea below 12 grammes (3½ drachms) daily indicates only failure of nutrition.

Alois Biach ¹¹³_{Mar. 30} reports a case of medullary cancer developed from pyloric ulcer, and Rosenheim ⁶⁹_{Apr. 10} refers to the quite frequent association of the two, and claims that the presence of free hydrochloric acid with symptoms of cancer points to the origin of the latter from ulcer, while absence of the acid does not disprove such origin.

Siredey ³_{Nov. 15} had a case involving the pylorus and greater curvature, with palpable tumor, which ran a latent course; and F. Kebler ⁴²⁶_{June} gives a similar case, in which the tumor was so movable and the symptoms so few that floating spleen was thought to be present. Florian Krug ²⁷_{July} showed a pyloric cancer in which the dilatation was so great as to lead to the diagnosis of ovarian tumor. J. Clavelin ²⁴³_{Oct.} made the diagnosis of pernicious anæmia in a case which post-mortem showed cancer of stomach, posterior mediastinum, abdominal lymphatic glands, mesentery, and pancreas. Lefebvre ⁷_{No. 8} exhibited a specimen in which, owing to the weight of the growth and the consequent displacement, cancer of mesentery was diagnosed.

John S. Ely ⁵_{June} had a case of secondary involvement in which the primary origin was in the right testicle: secondary growths along spinal and pelvic lymphatics, involvement of inferior cava, growth through its wall, infection of the blood and metastasis in lung and stomach. The author thinks that secondary infection of the stomach arises either by implantation of carcinomatous material brought by the œsophagus from an ulcerated spot higher up or by infection through the blood. The lymphatics are an extremely rare channel of transport for infectious material to stomach. Trehari ⁷_{No. 11} reports a case with involvement of peritoneum, ovaries,

and uterus. R. Percy Smith¹⁰⁶_{July} reported a case of cancer, with hallucinations of taste and smell, without organic brain-lesion. P. Cupper⁹²_{Apr.} describes 4 cases in which symptoms of bulbar palsy appeared. He thinks a permanent organic lesion of the medulla may be produced by an ascending neuritis of the pneumogastric. Massalongo⁹⁰⁰_{Nov.} reports cases of epileptic seizures in gastric diseases, ceasing when the latter were cured. He thinks the convulsions due to auto-inoculation, and recommends disinfectants and purgatives. Faure²¹¹_{Apr. 22} gives a case complicated by insanity, with delusions of persecution. Mouisset²¹¹_{Oct. 19} found, as a complication, gangrene of the leg. Post-mortem, hard and stratified concretions were found on the tendons of the left ventricle, the valves being healthy. The right femoral artery was plugged by clot. In Clavelin's case²⁴³_{Oct.} the symptoms developed after influenza.

Hoeberlin,²²⁶_{B. 44, p. 101} from a statistical examination, finds that cancer of the stomach occurs twice as often in Switzerland as in Berlin or Vienna. In Zurich cancer of the stomach in woman is twice as frequent as cancer of the uterus, while in Vienna the contrary is true. Debove¹⁰⁰_{Nov. 26, 78} reports a case in a youth of 18 years. Henry F. A. Goodridge²_{May 10} reports a case of cylindrical epithelioma, causing gastro-colic fistula. There was stercoraceous vomiting, constipation, flatus by mouth, slight epigastric tenderness, and some feeling of solid resistance in that region. No abdominal distension; no succussion splash. No food, so far as known, had passed undigested by bowel. Post-mortem, a deep tunnel-shaped ulceration, with its apex reaching the interior of the stomach, and forming there a valve, was found between the two organs. Carl Beck¹⁵⁰_{Mar.} performed laparotomy for ulcer, death occurring on the fifth day. Hoeberlin⁴⁹⁷_{Jan. 18} places great value on the examination of urine in diagnosis, urea being diminished. Indican showed no variation in 20 per cent. of the cases, was increased very much in 20 per cent., and moderately in 60 per cent. He found HCl absent from the gastric juice in 7 cases out of 21. In some cases he did not find absorption, tested by iodide of potash, delayed. Hæmoglobin was sometimes reduced to 50 per cent.

GLANDULAR ATROPHY.

Nothnagel¹⁴⁷_{Oct.} divides glandular atrophy into four classes: (1) atrophy arising from gastric catarrh; (2) from carcinoma; (3)

the form described by Fendig, with thinning of the walls, and (4) with hyperplasia of the walls. He reports a case with the following history: Anorexia of four years' duration. No nausea, no eructation, rarely vomiting; loss of flesh; complexion sallow and cachectic; pulse 64; temperature very irregular; abdomen contracted; no tumor; percussion over stomach normal; spleen slightly enlarged. In urine no albumen, but indican present. Examination of blood showed anæmia. No free hydrochloric acid in the gastric contents, nor ferment-cells, nor sarcinæ. Large quantities of lactic acid. He diagnoses this case as belonging to the third or fourth class. Meyer¹¹⁴_{B.10, H.2, 4}⁹⁰_{Mus.} has made a study of cases in which the atrophy varied, being in some complete, in others not. He proposes the name phthisis ventriculi, and urges that examination of the gastric nerves be made. Microscopically, he found small-cell infiltration in the interglandular connective tissue, cloudy swelling and fatty degeneration of the gland-cells. The infiltration begins on the surface of the mucous membrane, which becomes villous. Obstruction cysts may form. The muscularis mucosæ is much thickened. In a second form an increase of the interglandular connective tissues occur along with the cellular infiltration, and these changes begin in the deeper parts and proceed toward the surface. The organ may be normal in thickness or thinned or thickened. The disease is most common in the aged. The symptoms are those of pernicious anæmia. There is no secretion of mucus. There is apt to be radiating pain from the epigastrium. The points in differential diagnosis from cancer are absence of tumor and vomiting, the retention of subcutaneous fat, and the absence of wasting. Westphalen²¹_{Aus.11} reports a case with motor insufficiency without pyloric stenosis. Gastro-enterostomy was performed in the hope that the hastening of the passage of the food into the intestine would prolong life. Death followed on the fourth day. Kernig²¹_{Aus.11} opposed operation because the dilatation was not marked, and, phthisis pulmonalis having been present, it was probable that part of the dyspeptic symptoms were due to it. Tilling,²¹_{Aus.11} on the other hand, thinks that in cases like the above, in which starvation impends, operation is quite justifiable. Adler¹⁵⁰_{Mus.} showed a case which during life had been diagnosed as tumor. There had been pain in the legs and loins, with presence of tumor, for two years. Appetite good and no emesis. Post-

mortem the tumor was found to be the tremendously dilated stomach filled with undigested food. Einhorn¹⁹¹_{Dec., '96} reports a case in a man of 20, in whom the disease began at 18 years, in whom HCl, pepsin and rennet ferment were always observed. Cancer and amyloid disease being excluded, and as neuroses never stop the gastric secretion entirely, the specific ferments being always present, he concludes it to be atrophy following chronic catarrh.

Dilatation.—Dujardin-Beaumetz⁸⁰_{Jan.} points out that dilatation from mechanical causes does not produce the nervous phenomena which we see in gastriectasis. Sufferers from this disease often have offspring who are similarly affected. Errors and defects in diet in early life may cause it, but we are compelled to include also a predisposition of nervous origin, which favors distension of the muscular coat. He believes, too, that there are many cases in which the symptoms depend on a dilatation of the colon. *Bruit de clapotement*, heard below the line joining the borders of the false ribs on the left side to the umbilicus, is the most important physical sign. Bouillard³_{Aug., '15} thinks that transient dilatation may be caused by swallowing large amounts of nasal mucus, which may plug the pyloric orifice. Hermann Lenhartz⁸⁹_{Feb., '6} found no case of floating kidney complicating dilatation. Derignac³_{Aug., '15} claims that in the course of auto-intestinal intoxication, with dilatation, glycosuria may appear. In 2 cases it passed off with the disappearance of the original trouble. James McNaught²_{Mar., '1} has made a very careful study of a case in which there was eructation of inflammable gases. Desplats²²⁰_{May '20} reported 2 cases to the Société des Sciences Médicales de Lille, in which influenza produced acute gastritis and intestinal palsy. Fernand Merlin²²⁸_{Nov., '15} gives a case with tetaniform convulsions and death, and has collected several similar ones. Carron de La Carrière²⁴_{Nov., '17, '20} thinks that nervous dyspepsia may be due to dilatation, or, on the other hand, that the “neuras-thenia begins, and the affection of the stomach completes, the tableau” (Charcot).

MISCELLANEOUS PATHOLOGICAL CONDITIONS.

C. Malvoz²⁶⁸_{Aug., Sept.} found, post-mortem, in a woman 78 years old, dead of double pneumonia, a sarcoma of the smaller curvature. She had been under observation only two days, and during that time no symptoms appeared referable to the growth. May⁸⁴_{Mar., '14}

reports that in studying the histology of the gastric mucous membrane he quite frequently found thrombosis of the capillaries. From their conduct toward stains and reagents he regards the thrombi as so-called hyaline thrombi. They were found in chronic cases of carcinoma, pulmonary phthisis, and heart disease. They were not found in acute cases nor in the healthy stomachs of dogs and mice. Hyaline degeneration of vessel-walls was not always found. He regards this thrombosis as the first step in the causation of ulcer. Smith ⁸²_{May 24} reports 2 cases in which bits of broken glass and a pin were swallowed by children and passed without injury. Rudolf Kunze ²²⁶_{B. 40, H. 3} reports a case of lipomyoma. Man, 52 years old, complained for fourteen years of pain in the middle of the abdomen. Vomiting and eructations were never present. In the umbilical region could be felt a tumor as large as the fist, rough, movable in all directions, and with easily definable borders and of good consistence. Tumor of the mesentery was diagnosed. On operation it was found in the anterior wall of the stomach at the cardiac end. Death followed in fifteen days. Stinzing ³⁴_{Feb. 15; May 5} has made a careful histological study of the stomach in affections of other organs. In acute miliary tuberculosis the epithelium of the rugæ was found degenerated. There was great hyperæmia of the upper epithelial layer, with few leucocytes, much small-celled infiltration, and hypertrophy of connective tissue. The lumen of the glands was widened, and contained mucous masses, but no cells. Food-cells (mastzellen) were found between the glands. There was no pigment in the muscularis mucosæ. In case of hypertrophy and dilatation of heart, he found great increase of connective tissue, tubular glands diminished in number and much branched, food-cells numerous, scanty pigment in the muscularis mucosæ. In typhoid fever there was degeneration of epithelium of glands and of superficial layer and increase of connective tissue; glands dilated, their mucous membrane in folds, and their lumen filled with mucus and the remains of leucocytes.

E. Moritz ⁸⁴_{Oct. 11} reports 3 cases of irregular fever, exanthematous eruption, and rheumatic pains, occurring in men without organic disease and with absence of HCl. He concludes it was an infectious fever, of mycotic origin, from organisms permitted to live by the absence of the acid, treatment by which gave relief. Eng. Fraenkel ²⁰_{Dec. 70} reports a case of acute emphysematous gastritis occur-

ring in a man who had compound fracture of the finger. The wound did well, but death followed the gastric trouble, which, he thinks, was mycotic in origin. Steinberg²_{Nov. 20, '90} reported to the Russian Medical Society of Warsaw a case of periodic gastrorrhœa. Man, aged 45; series of attacks of violent vomiting coming on every forty to sixty minutes, each attack being preceded by severe nausea and headache, which symptoms disappeared immediately after stomach contents were rejected; no abdominal tenderness nor pain. Westphal's and Romberg's phenomena were present, but no other cord symptoms, and there was no ataxia; hence, the diagnosis was periodic gastrorrhœa in a tabetic rather than gastric crisis in an ataxic. Joseph Stedman⁹⁹_{May 29} reports several cases of persistent vomiting of obscure origin in children. Rotch, in discussing the above cases before the Obstetrical Society of Boston, said that such children rarely die from this disease; usually, the attacks come on every fifteen to thirty minutes for about twelve hours and then grow less. The active stage of the disease usually lasts two to three days. He regards irritation of the abdominal sympathetic as the cause. It occurs in infants as well as children and in the breast-fed as well as in the bottle-fed. Temperature and pulse are normal or a little below. Recovery is often sudden. Massalongo⁷⁰⁰_{Nov. 15} claims that dyspepsia is nothing but an auto-infection kept up by altered innervation of the stomach. He has experimentally demonstrated these toxins and found that their inoculation produced the symptoms of the disease. Pietro Albertoni⁵⁰⁶_{Nov. 12, '90}⁴¹_{May 29} has made a study of adenoma of the stomach, from which he concludes it may run a latent course. It may originate in an ulcer. The presence of symptoms of ulcer, without the usual causes, points to it, especially if a tumor be present. It may be the starting-point of a cancer. If a tumor be present the following symptoms speak for adenoma and against cancer: long duration, the presence of an almost normal amount of HCl, the slight effect on general nutrition. Adenoma, as any other tumor, may, if it presses on an artery, produce phenomena simulating aneurism.

CLINICAL EXAMINATION OF THE GASTRIC JUICE.

But little of clinical importance has been discovered during the past year, though much time has been spent upon this subject and previously known facts still further studied. R. von Jaksch¹¹⁴_{Nov. 17, '04}

proposes the following test for free hydrochloric acid : To 10 cubic centimetres (2.7 fluidrachms) of the liquid to be tested add a few drops of neutral tincture of litmus. Add carbonate of barium, free from chlorine, till the mixture is no longer red. Evaporate to dryness in a platinum crucible over a water-bath. Heat till the organic substances are burnt off. Cool. Extract with not more than 100 cubic centimetres (3.38 fluidounces) of hot water. The weight of the barium sulphate formed multiplied by 0.3132 gives the amount of hydrochloric acid. Filtering the fluid reduces the amount of acid very much. By experiments on children he found that ham caused the greatest amount of secretion. Milk causes rapid secretion, but at first combines with the acid. Pure carbohydrates excite secretion quickly, but later only a slow, slight increase occurs. Absence of hydrochloric acid, or only a trace, three hours after eating, points to serious gastric disturbance. The acid increases with age and weight. Hayem⁸²⁷ July 28 maintains that it is not sufficient to obtain the amount of free hydrochloric acid, but that the proportion of chlorine, especially in its albuminoid combinations, must be studied. Again, D. J. Hamilton,² Aug., as he stated to the British Medical Association, in July, believes the peculiar characteristics of acid dyspepsia are due to lactic acid, rarely to hydrochloric. The acidity may be increased by various volatile organic acids. If the acidity is due to HCl, then either it is secreted in a gush immediately on introduction of food or it accumulates during fasting. Günzburg's test for HCl rarely gives fallacious results. Uffelmann's method is one of the best tests for lactic acid. Another good test is one drop of liquid ferrisquichloride in 50 cubic centimetres (1.69 fluidounces) of water. The colorless solution becomes yellow on addition of lactic acid, and the reaction is not interfered with by peptone and but slightly by albumen and HCl. Albert Mathieu and Rémond,³ Nov. 18, in a report to the Société de Biologie, November 15th, proposed a method for the determination of the organic acids, depending on their solubility in ether, while the mineral acids are almost insoluble.

F. P. Kinnicutt⁵⁹ May 24 regards Günzburg's test for HCl as the most sensitive and least liable to error. Marfan,⁹⁰ July, on experimenting with Günzburg's method of testing digestive power by the rapidity of elimination of potassium iodide, found that 3 per mille of HCl gave reaction in three-quarters of an hour, 2.5 per mille in one hour,

and 1.5 per mille in one and three-quarter hours. The normal time is one hour. Armin Huber²¹⁴ holds Ewald's method of estimating motor capacity of the stomach by the time of beginning excretion of salicylic acid in the urine as not trustworthy because it varies greatly in health. He proposes to use instead the time taken for complete excretion. In the healthy this requires twenty-seven hours, while if there be motor insufficiency a longer time is needed. Kinnicutt⁵⁰ uses Klemperer's method for estimating motor efficiency, namely, the introduction of 100 grammes ($3\frac{1}{2}$ ounces) of olive-oil into the stomach and withdrawing what remains at the end of one hour. Normally, this would be 20 to 30 grammes (5 to $7\frac{1}{2}$ drachms).

Axel Johannessen¹¹⁴ finds that acetic or lactic acid can change propepsin into pepsin and labzymogen into labferment; so that, if HCl be wholly absent, the ferments may be present. In hyperacidity the quantity of ferment is not correspondingly increased. Hoffmann³¹⁹ shows experimentally that Leo's method for determining the amount of free acids and of acid salts is unsatisfactory. Lenhartz⁶⁰ considers it proven that three hours after a test-meal or one and a quarter to two hours after a test-breakfast, free HCl will be found in sufficient quantity to give Günzburg's reaction. Max Einhorn⁵⁰ has invented an apparatus for obtaining small quantities of the gastric contents. It is a little bucket, $1\frac{3}{4}$ centimetres long by $\frac{1}{2}$ centimetre wide, attached to which is a thread. The patient swallows it and after a few minutes it is withdrawn. If there be much mucus present the top is covered with a thin film of gelatin.

Some study has been given to the influence of HCl and of gastric juice upon the development of microbes. Hamburger³¹⁹ finds that pure HCl, and in less degree pure lactic acid, in very slight concentration destroy the bacillus of typhus, anthrax, cholera, and the different kinds of staphylococcus, while the spores of anthrax resist 2 per cent. of acid. Peptone decreases the antiseptic power of the acid by combining with it. Further experiments proved that the effect of human gastric juice was due only to the acid, and not to any peculiar antiseptic property of the fluid itself. G. Leubuscher¹¹⁴ finds that bacteria develop well in the intestinal and pancreatic juices. Digestive ferments have no effect on living organisms. Fresh gall has little disinfectant action, but taurocholic

and glycocholic acids in saturated solution destroy many forms. Many papers are devoted to the chemistry of the gastric juice in particular pathological conditions. Lenhartz,⁶⁰_{Nov. 4, 17} made a very careful study of 390 patients, and was surprised to find in almost 48 per cent. of the chronic dyspeptics diminished HCl. In chlorosis and anæmia the acidity varied, with absence in 45 per cent. HCl was also absent in 2 out of 13 cases of ulcer, and in 1 case of Addison's disease proved post-mortem. Francis P. Kinnicutt,⁵⁹_{May 24} holds that the constant presence of HCl points certainly to the absence of cancer. Max Einhorn,¹⁹¹_{Dec. 7, 99} being given a case with complete absence of HCl and pepsin during three months, with constipation, vomiting, headache, and anæmia (cancer, amyloid disease, and neurosis being excluded), diagnosed atrophy of the mucous membrane following gastric catarrh. According to Rosenheim,⁶⁹_{Apr. 10} if undoubted signs of cancer be present and free HCl persists, it is probable that the cancer has developed from ulcer; and, on the other hand, the persistence of HCl or hyperacidity does not positively disprove cancer. L. Herzog,¹¹⁴_{Nov. 17, 1894} in 14 cases of nervous dyspepsia, found only 1 with normal motor power and chemism. The others showed alterations in one or both factors. Paul Chéron,¹⁷_{May 20} thinks that hyperacidity is the rule in ulcer, but that HCl is not always absent in cancer. In dilatation the gastric reaction is very variable. Sometimes dyspepsia is caused by organic acids from fermentation. In febrile states HCl is diminished or absent.

Hayem,⁸²⁷_{July 29; Sept. 12} divides dyspepsias chemically as follows: those in which there is increased chlorides, increased HCl, and increased total acidity; those in which there is a decrease or absence of the same; and a small number in which the gastric chemistry is but slightly modified,—simple dyspepsia,—caused by nervous or mechanical trouble. L. Herzog,¹¹⁴_{Nov. 17, 1894} maintains that diagnosis can not be based on chemical examination. Nervous dyspepsia may be attended by motor weakness with variable acidity, or only the chemical function may be lowered or increased; or, in a rare form, motor power and secretion may both be normal. L. Georges,¹⁸⁴_{Sept. 1} made an elaborate study of artificial and natural gastric juice. In 8 cases of "chlorotic anæmia" gastric digestion was *nil*, in 2 slight, and in one normal. In ulcer it was sometimes good, sometimes poor. Stratievsky,¹⁰⁰⁰_{Nov. 21; Oct. 200} experimented on 6 healthy men to determine the effect of fluids taken during meals on the assimila-

tion of proteids. In each case the experiment lasted ten days, during five of which broth or tea were taken at meals, and during the other five no fluids were allowed at that time. The diet consisted of bread, butter, meat, sugar, and salt. He found that when no liquids were allowed the assimilation of proteids was decreased an average of 1 per cent., from which it follows that the habitual eating of dry meals must exercise an injurious effect, even if liquids be allowed between times. From experiments on children, Carl Noorden¹¹⁴ proves that the intestines can perform all the digestive work of the stomach. F. C. Shattuck⁹⁹ sums up the results of the chemical tests and the use of the sound in gastric troubles as follows: The sound enables us to determine time required for digestion, and also whether size and seat of the organ have undergone alteration. It contributes toward a pathological classification of the conditions vaguely termed dyspepsia. Chemical examination is an aid in diagnosis sometimes, but its use is quite subordinate to that of rational signs and requires more time than can be given.

Kurlow and Wagener,²¹ from experiments, conclude that certain microbes live normally in the gastric juice, but those which enter with the food are destroyed in normally acid stomachs. Normal gastric juice is a powerful destroyer of pathogenic germs, and only strongly resisting spores, such as those of tubercle and anthrax, and sometimes staphylococci, escape. The microbes of typhoid, cholera, and tetanus die in less than one-half hour.

THERAPEUTICS.

Penzoldt^{116 549} Feb., Apr. recommends orexin in the anorexia following surgical operations, and in tuberculosis, chlorosis, and heart affections. Its chemical name is phenyldihydroquinazolin. It consists of colorless, shining needles. The hydrochlorate is freely soluble in water. It increased appetite and decreased time of digestion by one-half to one hour. The dose is 5 to 7 grains (0.32 to 0.45 gramme), twice daily, in large amounts of liquid. Other experimenters, however, seem not to have obtained the same good results. Germain Sée⁸¹ recommends cannabis Indica as a gastric sedative in most non-organic affections associated with pain. Unlike morphia, it does not produce nausea and vomiting, nor decrease the gastric secretions. It has no effect in atony or dilatation. Pyrosis

is not diminished by it except that the burning sensation disappears. Orexin he regards as useless. The crude extract should be used in doses of $\frac{1}{8}$ grain (0.022 gramme), three times daily. Georges¹⁸⁴_{Sept. 1} found many preparations of HCl, pepsin, pancreatin, and papain to be without effect in either artificial or natural gastric juice. Huchard²⁹⁶_{May 8} reports a case of paroxysmal pain from hyperacidity, relieved by large doses of soda bicarbonate. H. B. Donkin⁶_{Sept. 27} advises exclusive rectal feeding in ulcer. Robert Laundly²⁶_{Feb.} advises purging and digitalis in chronic gastric catarrh if heart disease or chronic bronchitis be present. Dujardin-Beaumetz⁶⁷_{Sept. 15} prefers salicylate of bismuth, naphthol, or salol as gastric antiseptics. R. F. Bennett¹⁹²_{Feb.} also recommends salol in chronic gastralgia, especially if there be much secretion of mucus. L. G. Kraune⁶⁷_{Apr. 20} recommends condurango-wine in dyspepsia, catarrh, ulcer, and cancer. In the latter he has seen vomiting, pain, and constipation cease, appetite increase, and the general appearance of the patient and his strength improve. Franz Heller,¹¹⁸_{Jan. 25} from experiments on himself, finds sauer kraut at meals the best remedy in nervous or anæmic dyspepsia! Z. N. Upshur did great good in a case of paroxysmal spasmodic indigestion with nitro-glycerin. A. Z. Meuer¹⁵⁵_{Apr. 20} recommends lavage, especially in indigestion in children.

Baraduc,³_{Aug. 10} at the Association Française pour l'avancement des Sciences, August 8th, recommended galvanism if HCl be absent, and intra-gastric faradism in atony, hyperacidity, dilatation, with motor dyspepsia. Tessier, on the other hand, thinks faradism possibly dangerous because of reflexes to brain or heart. Lancereaux³_{July 28} protests strongly against treating hyperacidity or dilatation instead of the underlying cause. He stops all acid foods. With dry diet he has had no success. Hydrotherapy is especially useful. Brittan⁸⁹_{May 16} reported to the Toronto Medical Society, April 22d, a case of reflex gastralgia relieved by rectifying a complete retroversion of the uterus. Tison,¹⁰⁰_{Aug. 16, 19} in a communication to the Association Française pour l'avancement des Sciences, recommends 5 to 6 pills of chlorohydrate of cocaine, each 1 centigramme ($\frac{1}{8}$ grain), with 1 centigramme ($\frac{1}{8}$ grain) of thebain, ten minutes before eating, in rebellious vomiting in phthisis, gastritis, alcoholism, dilatation, and cancer. Cséri⁸⁴_{Aug. 1} uses the following plan for the mechanical treatment of chronic dyspepsia: Massage to the abdomen when the stomach is full two or three hours after the principal meal. He

strokes and kneads the stomach from fundus to pylorus, first gently, then more strongly, for ten or fifteen minutes, the patient lying on his back, with legs drawn up, and breathing with open mouth. During the last few minutes the massage is extended to the bowels. F. P. Henry¹⁵¹_{May} finds milk diet of little use in nervous dyspepsia. Max Einhorn¹⁹¹_{Dec., '99} treated a case of continuous gastric flow with large doses of alkalines and occasional lavage, albuminoid food, and small quantities of liquids. Rotch⁹⁹_{May '99} stated to the Obstetrical Society of Boston, March 8th, that in the persistent vomiting of children he recommends absolute quiet in a darkened room, no food in the stomach for several days, small doses of chloral and bromide by rectum; after forty-eight hours small enemata of peptonized milk, and, finally, mild broths and milk and lime-water by mouth. Lionid K. Pavlovsky⁸⁰⁰_{Dec., '99} ¹⁰⁹_{May} recommends resorcin strongly in vomiting of gastric origin. If it be reflex the drug is less useful. Dose, 5 grains (0.32 gramme) every one or two hours. François Cartier¹⁷_{Dec. 10, '99} recommends tincture of iodine in tuberculous vomiting, in doses of 10 drops, dissolved in 120 grammes (3½ ounces) of water and taken in three parts after eating. Bouveret⁸⁰⁴_{May} prefers an infusion of fresh pancreas to manufactured pepsin. He makes a pulp of fresh swine-pancreas, adds double the weight of water, heats moderately (45° to 50°) for thirty to forty minutes, and then filters.

DISEASES OF THE PANCREAS.

Physiology.—Abelman^{1091; 844}_{July} has made a study of the effect of extirpation of the pancreas upon digestion of albuminoids, fats, and carbohydrates in dogs. In incomplete extirpation 54 per cent. and in complete 44 per cent. of albumen was absorbed. If fresh pancreas was added to the food the percentage rose to 74. Twenty to 40 per cent. of starch was not changed into sugar nor absorbed. In complete extirpation fat was not absorbed even if given in emulsion. In emulsion with pancreatine, in 1 case there was no absorption, in another 18 per cent. was absorbed, but if fresh pig-pancreas was added the percentage rose to 73; 28.2, 30, and even 53 per cent. of milk without pancreas was absorbed. Gillet,⁸¹_{Aug. '99} reported to the Tenth International Congress, August 4th, that he had studied the digestive powers of the pancreas in infants by removing the organ as soon as possible after death and treating starches, fats, and albumen with it. Starch was scarcely altered.

Acute Pancreatitis and Pancreatic Hæmorrhage.—No systematic studies of this disease have appeared during the past year. R. H. Fitz,⁹⁹ in a paper read at the annual meeting of the Association of American Physicians, May 14th, supplements his previous work by a report of a case and a collection of others reported. His own case gave the following history: Male, aged 67. Sudden abdominal pain, lasting one day. A week later, gradual swelling of arms and legs. Jaundice. No nausea nor vomiting. Anorexia, but craving for acid drinks. Micturition frequent at night; urine high colored. He felt well and came for treatment on account of jaundice. The abdomen was distended; tympanic in the elevated, flat in the dependent portion. A movable mass was felt below the liver, but no connection between the two could be established. It descended on inspiration and transmitted a pulsation synchronous with the heart-beat. Temperature at first normal, later subnormal. Marked somnolence. Post-mortem, the common bile-duct was found pressed upon by a diffuse, purulent infiltration of the pancreas at the junction of the head and tail. Microscopically there was extensive round-celled infiltration. Many large and small abscesses were also found, frequently so situated as to suggest their origin from the ducts. Ducts were found containing detached epithelium and bacterial colonies; others were filled with leucocytes, the epithelium being still adherent. Again, clumps of epithelium were found in the midst of masses of leucocytes. In the peripancreatic fat-tissue an abundant round-celled infiltration was sometimes seen. In the lobules the parenchymatous cells seemed at times replaced by others, which contained less protoplasm and a nucleus stained throughout, instead of assuming a ring-like aspect. He concludes that while in the suppurative form of disease the lesions are limited, and there is a conspicuous affection of the ducts with destruction of the lobules by suppurative and fibrous changes, in the hæmorrhagic and gangrenous forms the lesions are diffused, the exudation is hæmorrhagic, cellular and fibro-cellular, and the lobules destroyed by a coagulation necrosis. It is questionable if a diagnosis can be made in the absence of evidence of an acute epigastric peritonitis.

Langerhaus,⁴ reported to the Berlin Medicinische Gesellschaft, Dec. 4, 1889, a case of the gangrenous type, which, for a

time, was diagnosed typhoid fever. Headache, bile-colored vomit, burning pain in the left hypochondrium; on the abdomen, isolated, small, red, slightly-raised points, disappearing on pressure. At no time was sugar found in the urine. Duration, nine weeks. Post-mortem, the necrosed pancreas was found lying like a sequestrum in a cavity similar to a phthisical vomica. There were communications between the cavity and the stomach and small and large bowel. Hausemann, in discussing the case, spoke of 3 similar ones, all in men, and in 2 of which roseola was present, persisting after death, and overlying spots of subcutaneous necrosis. Sugar was not present in the urine. Dittrich reported ⁸⁴_{Dec. 14, '79} to the Verein deutscher Aerzte in Prag, Nov. 15, 1889, a case of the hæmorrhagic type, with death from peritonitis. Though micro-organisms were not found even in the necrotic parts of the organ, he does not think that the mycotic origin of the disease is excluded. F. A. Harris ⁹⁹_{Dec. 19, '78} reports a case of death from hæmorrhage, the woman having been picked up in the street, and the condition only recognized post-mortem. The entire splenic end of the organ was infiltrated. Otherwise the organ was apparently healthy. Fitz ⁹⁹_{Dec. 19, '78} said death was due to irritation or palsy of the celiac plexus, causing cardiac failure. The hæmorrhage is sometimes in the immediate vicinity of the ganglion, but the effect may be purely reflex. J. McLeod ²⁸⁴_{Sept.} also reports a case of hæmorrhagic pancreatitis, though it may have been cancerous.

CHRONIC DISEASES.

F. de Grandmaison, ¹⁰⁰_{Jan. 4, Mar. 1} in a review of the symptomatology of of this subject, gives steorrhœa, glycosuria, results of compression and rapid emaciation as the cardinal points in diagnosis. The first is not always present and is not pathognomonic; the glycosuria comes on suddenly and is associated with marked emaciation. Boils and carbuncles are not met with. Compression symptoms arise mainly from occlusion of the bile-duct, causing a gradually oncoming icterus. Often epigastric pain, intestinal dyspepsia, and much flatulence are present.

Councilman ⁷⁶⁴_{Apr.} reported to the Johns Hopkins Medical Society, Jan. 20, 1 case of primary cancer with secondary involvement of the stomach, retroperitoneal glands, and kidney, which, owing to constipation and the position of the tumor immediately below the

ribs, was diagnosed as cancer of the transverse colon. In a second case the growth was primary in the colon and secondary in the pancreas and abdominal and cervical glands. In neither was the liver involved.

Wetherell,²_{Feb. 1} also described to the Pathological Society of London a case without involvement of the liver. There was gastric ulceration at the point where the growth adhered to the stomach. The symptoms were wasting for eighteen months; epigastric pain, increased by food and relieved by vomiting, which, for a time before death, was black. H. M. Fisher⁹_{Aug.} details a case in which, though the stools were chalky, there was no jaundice. Panly,²¹¹_{Mar. 30} before the Société des Sciences Médicales de Lyon, March, tells of a case in which glycosuria and albuminuria were never present. Destot²¹¹_{Oct. 19} reported to the same society in July a death after exploratory laparotomy. Both pancreas and liver were carcinomatous. N. G. Richmond¹⁷⁰_{July} narrates a case interesting from the character of the stools, which came liquid from the bowel, but when cool formed solid plates of a golden-yellow and wax-like consistency. Rovighi⁵⁹⁸_{Feb. 1} speaks of the arterial murmur in carcinoma of the pancreas heard most distinctly in epigastrium.

Amyloid Disease.—Podbielsky⁵⁹⁸_{Dec. 27, '98} has met with amyloid disease of the pancreas in 12 autopsies out of 122. Macroscopically, greater or less anæmia was visible, and consistency harder than normal. Microscopically, there was found degeneration of the middle and small-sized arteries of the interstitial connective tissue, as well as of the capillaries around the glands. Fatty degeneration of the secreting cells was almost always present.

Cysts.—F. Treves⁶_{Sept. 27} gives the following symptomatology of this affection: Painful fullness after eating, digestive disturbance, possibly nausea, eructations. Patient usually feeble, depressed, and languid. Marked emaciation and vomiting are rare. Vague and slight epigastric pain. Bowels usually regular; sometimes diarrhœa, but never fatty stools. Skin usually dusky, dirty, earthy, unhealthy-looking, or yellowish. The tumor usually increases rapidly, is round and tense. It is elastic and may not give a sense of fluctuation. It is of clear outline, often presents aortic impulse, but usually is not movable. Adhesions are quite uncommon. It is situated above the umbilicus in the epigastric region, but may be large enough to fill the whole abdomen. The fluid is usually

turbid, brownish, odorless, and of rather high specific gravity. It is alkaline or neutral, contains albumen, but neither bile nor urea. It emulsifies fat and converts starch into sugar, but sometimes has no digestive properties. Treatment should be by incision and drainage. No attempt should be made to remove the cyst. Repeated tapplings, and even exploratory tapplings, are to be condemned. He reports a case operated upon successfully, and interesting from the great depression, somnolence, and pin-hole pupils present for some time. Karewski⁶⁰_{Nov. 13} defines the boundaries of cysts as follows: above the stomach, on the left spleen, on the right liver, below colon, but separated from liver and spleen by a tympanitic zone. It follows respiratory motion to a certain degree, but it may be so great as to be indistinguishable from an ovarian tumor. Echinococcus of the liver develops on the right side of the body. Glycosuria and fat diarrhoea may also be present. Small cysts may cause no symptoms. Exploratory puncture is of little use, for the fluid is not always the same, and chemical examination may reveal nothing. He reports 2 cases successfully operated on. Liwshitz⁸⁵⁰_{Nov. 18} reports that in a patient with cancer of the head of the pancreas and cyst of the tail salicylic acid was not excreted in the urine after the administration of salol. He proposes the use of this drug as a diagnostic agent in diseases of this organ. Philippoff⁶⁵⁴_{Jan.} reports a case successfully operated upon in a woman 55 years old. Part of the anterior wall was cut away and the edges stitched to the abdominal wound. He thinks the cachexia found in these cases is due to interference with the abdominal circulation from the pressure of the growth. Leech²_{Apr. 19} described 2 cases to the Manchester Medical Society. Redner¹⁵⁰_{Oct.} tells of a case successfully operated on.

DISEASES OF THE LIVER.

Suppurative Hepatitis.—Simon⁷⁶¹_{Nov.} reported a case for Osler, in which the diagnosis rested upon the presence of amoeba coli in the sputum. Symptoms were constipation; pain in side; cough, with blood-stained sputum; stools containing mucus and blood; no chills, but fever at times and sweats. Later, sputum resembled anchovy-sauce; actively-moving amoebæ were found in it; liver enlarged behind; dullness at base of right lung and feeble breathing, which at angle of scapula was tubular, with large râles. Had

amœbæ not been found, the case would have been regarded as one of pleurisy. Pel ⁴_{Aug. 28} read before the Tenth International Congress a paper on the etiology and symptomatology of this condition. Mejia ³_{Aug. 27} says that out of 88,416 deaths in ten years, in the city of Mexico, 1985 have been due to hepatitis. Acute interstitial hepatitis is rare. Symptoms are jaundice, increasing in severity; signs of suppuration; compression of portal vein; rarely ascites; liver enlarged, but not the spleen. On section, the liver shows many, sometimes even 200, abscesses filled with a white or yellow-green pus. Redmond ¹⁶_{Nov.} showed a case of multiple abscess to the Royal Academy of Medicine in Ireland. Peters ⁸⁰¹_{Sept.} reports 3 cases of abscess and Douglass ⁶¹_{Nov. 15} 1. Stevenson ⁶_{Dec. 7, '90} describes 4 cases of tropical abscess, 2 ending fatally. One was remarkable for the rapidity with which suppuration developed after a severe hepatitis due to exposure to wet and cold; another case was remarkable on account of the great size of the abscess (60 ounces—1920 grammes) and the recovery of the patient after operation; and the last because the patient was only 2 years of age. J. J. Bland ¹²_{Aug.} reports 1 case at first diagnosed as tertian ague, and always relieved while under quinine, but always recurring. Later, the correct diagnosis was made and operation performed. In a second case the patient did well after an incision was made and a drainage-tube inserted, but he passed from observation, left the tube out, and allowed the wound to close. Soon the symptoms re-appeared, the abscess burst into the stomach, and the patient died from exhaustion. Chauvet ¹⁴²_{Feb. 25} reports 2 cases in which caries of the ribs resulted, caused, he believes, by the irritation set up by contact with the pus. Removal of the diseased bone and of the fistulous tract is necessary for recovery. Grainger Stewart ³⁶_{May} exhibited specimens from a patient who had had an hepatic abscess bursting into the lung, and who subsequently had paralytic symptoms pointing to an abscess of the brain, though there was no indication of pyæmia, and the palsy ultimately disappeared. The autopsy showed both gummata and cicatrices in the liver, with amyloid degeneration. There were the evidences of the old abscess, and near it another, apparently the transformation of a gummatous mass. It seemed probable that the first abscess had originated in the same way. A small abscess was found in the supra-marginal convolution, and there was slight basal meningitis.

Bertrand^{3, 6}_{Mar. 7, Mar. 10} calls attention to the perihepatic friction as a diagnostic sign that may be perceived both by ear and hand, and precedes by several days' œdema of the parts. It is also evidence that the liver is fixed to the abdominal walls by adhesive peritonitis. De Silva¹⁷⁴_{July} reports a case in which there was communication with the inferior cava by a small opening, which, however, was tightly plugged by a slough. Steven²_{Feb. 1} reports an interesting case of multiple abscess, secondary to pelvic peritonitis, following salpingitis. The patient had hectic fever, and was supposed to be suffering from phthisis. There were no definite symptoms calling attention to the liver or pelvic viscera. E. E. Brubaker¹⁰⁵_{Aug. 1} reports a case apparently consecutive to perineal abscess. Cure after several aspirations. Huybertsz¹⁷⁴_{July} gives an instance of what was first diagnosed tumor, a large and apparently solid prominence appearing upon the chest-wall, which was stated to have existed for five months. Later, correct diagnosis was made and incision performed, followed by death. H. C. Shutter⁷²_{May} reports a case in a woman apparently traumatic in origin. Barthélemy and Bernardy²⁴³_{Apr.} report 3 cases and speak of the frequency with which it is unrecognized on account of the latency of the symptoms. They base the diagnosis upon localization of the pain, with irradiation to the shoulder, the nature of the temperature curve, and the exclusion of pleurisy. They recommend a series of exploratory punctures and immediate evacuation by incision. They do not wait for adhesions to form, but trust to a sponge to prevent entrance of pus into the peritoneal during the operation. They wash out the cavity until the fluid returns clear.

Turri⁵⁰⁶_{Nov. 1, 2} publishes a case due to the penetration of ascarides from the duodenum through the bile-ducts into the substance of the liver. Laveran³_{July 20} reports absence of amœbæ and microbes from the pus in 2 cases. He accounts for it on the ground that pyogenic microbes had at first been present, but had rapidly died. Schoolfield⁵³_{Dec. 24, '90} reports 4 successive attacks in 1 patient, the last ending in death. Several others were described by Riely, Hall, and Beebe in the discussion. J. Redmond²²_{May 20} gives an instance of multiple abscess occurring in a woman of 33, and apparently due indirectly to biliary calculi. Grémillon²⁴³_{July} concludes, from a study of 5 cases, 4 of which recovered after operation, that malaria may be the cause as well as dysentery, and that in the former prognosis

is better, because in the latter smaller adjacent abscesses are apt to be present. The existence of adhesions previous to operation is of little moment. The previous opening of the abscess into a bronchus or into the pleura is not a contra-indication to operation. Frequent lavage and dressings are to be avoided. Hache⁸_{July} regards prominence confined to one or two intercostal spaces and fluctuation as important symptoms. Puncture should always be tried if abscess be possibly present. A. Hall⁶_{Apr. 12} exhibited a liver showing an old abscess about as large as a cocoanut and lined with a thick shell of calcareous material. It communicated with the exterior and with the peritoneum. H. Mackenzie²_{May 10} reported a case of tubercular hepatitis with multiple abscesses. McNutt¹⁰⁷_{May} describes a case of multiple abscess due to suppuration in the course of the entire portal vein.

Icterus.—Karlinski⁵⁴_{Mar. 1},⁹⁰_{July} describes 5 cases of infectious febrile icterus, 1 of them being fatal, which differ in many points from those described under the title of Weil's disease. Though he seems still disposed to class them here, he comes to no positive conclusion. The cases were characterized by icterus, albuminuria with casts, micro-organisms in the blood, and an intermittent temperature curve, which remained elevated three or four days, then fell rapidly to normal, remained so for two or three days, and then rose again. These recurrences were sometimes repeated several times, much as in relapsing fever. In all the disease set in with a chill. Enlargement of liver and spleen were early noticed. The micro-organisms, which he illustrates in a plate, consisted of curved bacilli, 2 to 6 micromillimetres in length, having a slow movement, and sometimes forming longer curves composed of several individuals joined together. They could be stained with all saturated solutions of the aniline colors, but became decolorized when treated by Gram's method. They lived but a short time out of the body and could not be made to grow in cultures. Inoculations of pigeons and chickens gave negative results. The number present seemed to bear some relation to the presence of the febrile stage. Inasmuch as all of the patients had suffered recently from malarial fever, the author is inclined to regard the disease as a form of relapsing fever modified by a post-malarial alteration of the blood. Meinert,³_{Aug. 27} in a communication to the Tenth International Congress, describes an epidemic of icterus occurring espe-

cially among children. He has collected reports of 518 cases in Saxony during the autumn of 1889. The initial stage lasted three to four days and was characterized by fever, vomiting, constipation, congestion of liver and spleen. The icteric stage appeared one to two days after defervescence and lasted about eleven days. Seventy-three per cent. of the children living in the region where the epidemic prevailed were attacked. Thirteen deaths were reported to him. Catarrhal conditions of the stomach did not predispose to the disease, while disorders of the respiratory tract, and especially influenza, did. It appeared to be both contagious and miasmatic. The author considers the disease essentially infectious, distinct from Weil's disease, and not to be confounded with any other disorder.

Denton¹⁹⁷_{Oct.} tells of a small epidemic of icterus among children attending the same school but living in houses far apart. The attack commenced suddenly, with vomiting, prostration, headache, vague gastric pains, and, in the course of three to four days, intense icterus. The whole process lasted ten to twelve days. Demiéville,¹⁹⁷_{Oct.} in discussing the cases, said he had seen similar epidemics. Hennig⁴⁰⁴_{Nov.} concludes, from a careful study of three house-epidemics of infectious icterus, that it is a general acute specific-infectious, miasmatic, non-contagious disease. It may be sporadic, epidemic, or endemic, and as a rule runs a favorable course. It stands in some way in a certain relation to typhoid fever and to typhus biliosus. The infectious agent arises outside of the human body. The disease never relapses. T. F. Raven,⁹_{June 28} believes that ordinary catarrhal jaundice may be infectious, and reports an instance in which one child of a family became icteric apparently from exposure to cold, and in which four other children did the same shortly afterward, without any discoverable cause, unless it were contagion from the first. Duchamp⁹²_{June; Nov.} reports 3 cases of what he regards as infectious icterus occurring in men engaged in opening a sewer. After what seemed to be an incubative period of five days, they were attacked by the symptoms of invasion, depression, myalgia, vertigo, epistaxis, and in 1 case fever. No enlargement of liver or spleen could be detected. Cutaneous hæmorrhages occurred, and albuminuria in 1 case. The period of decline lasted three to four weeks. Pepper,⁹_{Nov. 28} in an interesting lecture with illustrative cases, shows that various pathological conditions of the liver or its ducts

may be attended by fever of a peculiar type, and by other characteristic symptoms. He made a study of 21 cases, exclusive of certain instances of Weil's disease, which he does not include in this category. The fever is paroxysmal, is often ushered in by a chill, and rapidly rises to 104° to 105° F. (40 to 40.56° C.). It lasts for a few hours, and terminates by crisis. It is attended by thirst, distress, restlessness, more or less general pain, and perhaps hepatic pain, and not rarely vomiting. The fever may be repeated at regular or irregular intervals. After each paroxysm jaundice appears and lasts for some time. If the attacks be frequent, the general health suffers, though he has seen complete recovery after a hundred paroxysms without anything to signalize the termination of the process,—such as a morbid discharge, the passage of a calculus, etc. He believes that the fever is not due to retained bile, but to the existence of additional elements, such as the admixture with the bile of putrefactive matter and the absorption of it, or to reflex irritation of the heat-producing mechanism. The ptomaine-destroying function of the liver is of vast importance, the organ having the power of arresting pyogenic substances such as the albuminoses. If, now, the function of the liver is interfered with by distension of the bile-ducts, these substances may pass into the blood, and may be responsible for the fever which develops. In cases in which the febrile paroxysms occur frequently but irregularly, we must assume a lesion not continually sufficient to cause fever, but which is very liable to be increased by external causes. In the course of the above lecture he says that he has seen 3 cases answering to the description of Weil's disease, or, as he prefers to call it, "acute infectious jaundice." In 1, seen on the third day, the patient was wildly delirious, with a temperature of 105° F. (40.56° C.), suffering from severe headache, intense jaundice, vomiting, enlarged spleen, rapid pulse, albuminous urine, with granular and epithelial casts, and finally death in stupor on the sixth day. The autopsy showed infectious nephritis and granular disintegration of circumscribed areas of cells in the liver. The spleen was double its size and very dark. The case occurred several years ago, before there were facilities for examining the tissues for microbes. Sézary⁹² also reports a case of Weil's disease occurring in a butcher, the infection being introduced probably by way of inflamed tonsils. A. J. Farrell¹⁹⁹ discusses briefly the so-

called "black jaundice," which he has found rather frequent in Texas. He considers it malarial in nature, but regards quinine as the worst possible form of medication. He recommends calomel, ipecac, and bicarbonate of soda with ergot to check the tendency to hæmorrhage.

Dérignac³ reports a severe case of prolonged icterus, with fever, severe diarrhœa, anorexia, and enlargement of the liver, in which recovery followed the employment of gastro-intestinal antiseptics, brought about by the use of salicylic acid and lavage. Jaccoud²¹² calls attention to the difference between icterus from obstruction and true polycholic icterus, in which there is hypersecretion of bile. In the former the stools are acholic, while in the latter they retain their normal color. Polycholic icterus, rare in temperate climates, but very frequent in hot countries, is associated with an acute congestion of the liver, and is accompanied by fever. It does not last long unless it occurs in relapses. Icterus, not polycholic, yet without discolorization of the stools, may also occur when there is incomplete compression of the small bile-ducts. Leube^{319, 90} made some experiments to determine if urobilin gives the color to the skin in jaundice. He gave injections of pilocarpin and examined the sweat in a case in which the skin was markedly yellow, but the urine was free from pigment. Much bilirubin but no urobilin was found in the sweat, but only urobilin in the urine, as shown by the green fluorescence on the addition of chloride of zinc and ammonia. He believes that in such cases the bilirubin formed in the liver is re-absorbed and deposited in the skin, but in the kidney it is completely reduced to hydrobilirubin and excreted as urobilin. In ordinary jaundice the color of both skin and urine is due to bilirubin. In a paper on biliary pneumonia Pilliet⁷ describes the condition of the liver. He states that in all infectious disease it exhibits changes most numerous, and when icterus is present small foci are found, probably of the nature of emboli, and here are seen dilated vessels and swollen cells which have undergone a fatty or necrobiotic change.

Cirrhosis.—W. A. Edwards⁵¹ publishes an elaborate article upon this disease in children. He gives a table of reported cases and adds one of his own. Davidson¹⁸⁷ also reports 3 cases in which the diagnosis was confirmed by autopsy and two others that still live. M. P. Hatfield⁵¹ reports 2 fatal cases of congenital per-

noxious icterus in the same family. Autopsy made on 1 showed that the lesion was congenital biliary cirrhosis. H. M. Biggs⁵⁹ reports a case of alcoholic cirrhosis in a boy of 13. The immediate cause of death was alcoholism. He had been given whisky since he was $2\frac{1}{2}$ years old. Lancereaux¹⁴ divides cirrhosis into three forms,—alcoholic, malarial, and syphilitic. He reports 3 cases of the first, 1 being diagnosed as belonging to the fatty cirrhotic variety. He calls especial attention to the evidences of an intoxication and bilious vomiting, headache, semi-delirium, dryness of the tongue, gastric catarrh, and depression of temperature. He believes these symptoms to be due to an hepatic insufficiency, as a result of which peptones, putrid poisons, and toxic products from intestinal fermentation pass into the circulation through the liver, which would, in a state of health, arrest them. These phenomena of poisoning are those of uræmia. They differ, however, in that the headache is less continuous, the vomiting more frequent, and the delirium quieter. He does not believe that hæmorrhage from the stomach is due to rupture of œsophageal veins. On the other hand, Thibaudet reports a case running a latent course till a fatal hæmorrhage occurred, which at the autopsy was found to have come from the œsophageal veins. The apertures were small, and the bleeding had probably been continuous. Litten,⁴¹ in the course of experiments on animals, found that the portal vein may be thrombosed and yet the liver remain anatomically unaffected and secrete bile, but ligature of the hepatic artery is followed by death of the liver parenchyma. The seat of the principal vascular affection in the liver is the intra-lobular veins, and the obliteration of these is the chief element in cirrhosis. He has found a plexus of dilated veins at the lower end of the œsophagus seven times, and he believes that the hæmorrhage comes from them. The dilatation is caused by overfilling of the azygos into which they empty. Gratia²⁷⁶ has noticed a marked shortening of the intestine, with thickening of its walls and increase of the folding of the mucous membrane. He gives a table illustrating the amount of shortening. The condition is due to a sclerotic process in the tissue of the intestinal wall, especially of the adventitious coat. There is, in fact, sclerosis throughout the whole portal system. It interferes with the circulation of the blood and tends to cause ascites.

Reitmann⁸ has collected 24 cases in which there was severe

or fatal hæmorrhage into the gastro-intestinal canal. He discusses the causes and the difficulties of diagnosis, and reports a case supposed to be ulcer of the stomach which post-mortem turned out to be cirrhosis. Debove and Courtois-Suffit¹⁴_{Oct. 19} also report a case diagnosed as gastric ulcer. Marin²²⁸_{Oct. 16} had a case complicated by peritonitis and double pleurisy. Le Fort¹⁰⁰_{May 16} contributes an article on fatty cirrhotic liver, reviewing much of the literature. Hutinel¹⁴_{Dec. 29, '99} describes 4 instances in children of a variety of tubercular hepatitis,—one of the forms of fatty and cirrhotic liver. The symptoms were much the same in all 4,—emaciation, cyanosis, distension of the abdominal veins, ascites, enlargement of the liver and spleen, no icterus, dilatation of heart, sometimes galop rhythm perceptible on auscultation, slight tubercular involvement of the lungs, diminution in the secretion of urine. An autopsy made in one case showed fatty cirrhotic liver, with scattered tubercles. He thinks that in children the process is less severe than in adults. Luzet⁴⁵⁷_{Mar.} reports a case in which the anterior and under surface of the organ were covered with very prominent vegetations, some pediculated and some flattened. They were yellow, varied in size from a pin-head to a pea, and between them were reddish bands consisting of connective tissue, with numerous new-formed bile-ducts, with entire disappearance of the liver-cells, and with inflammation and thickening of the blood-vessels. In the yellow portions there was simple sclerosis along the vessels, with atrophy of the cells. Microscopically the condition somewhat resembled cancer.

Rosenstein⁴_{Sept. 28} delivered an address on hypertrophic cirrhosis before the Tenth International Medical Congress. He believes the disease to be quite frequent in Holland, and regards it as an individual disease and not as the first stage of the atrophic form. Icterus always accompanies it, and it arises only between the 20th and 40th years. He has never known alcohol to cause it. Poly-choly is present. Tordeus²⁷⁶_{Nov. 20, '99} reports a case in a boy of 9 years, in which no predisposing cause could be found. There was jaundice for a year and enlargement of liver and spleen. Nothnagel⁵⁷_{Dec. 1, '99} gives an interesting lecture upon cirrhosis based on a case of this type with a spleen enlarged from malaria. J. M. Clarke²_{May 1} reports an interesting case diagnosed as acute yellow atrophy following chronic jaundice, but which post-mortem proved to be

biliary cirrhosis, with, however, atrophy in place of hypertrophy, to which term he objects unless it be borne in mind that it is not present in all stages of the disease. He considers grave icterus as characteristic of the course of the disease.

Sharkey's ⁴¹⁸_{7.18} paper is of great importance as bearing on the causation of this disease. The peculiarities of the affection, which he believes to be a rare one, are permanent and generally marked increase in the size of the organ, a mesh-work of bile-ducts in the interlobular connective tissue in excess of anything found in other forms of cirrhosis, habitual presence of jaundice, absence of ascites, and long duration of disease. He is convinced that the disease does not result from permanent obstruction of the bile-duct, although this has been repeatedly stated to be the case. He reports several cases in proof of his position. Hanot and Gilbert ³_{Mar. 22} state that they have never seen an instance of alcoholic cirrhosis in which the organ was at first at all enlarged, and afterward became smaller than normal. They therefore claim that there is an alcoholic hypertrophic form distinct from the ordinary atrophic. This is of prognostic importance, for the atrophic form is nearly always followed by death, while the instances of recovery have been of the hypertrophic form. Recovery from the symptoms depends upon withdrawal of alcohol, and the employment of strict milk diet and such remedies as potassium iodide and mercury. In a certain number of cases the liver also diminishes in size with improvement in the symptoms.

Acute Yellow Atrophy.—Rosenheim ¹¹⁴_{2.18, 2.24, 7.10} reports a case in a girl 10 years old. The symptoms were sudden jaundice, vomiting, enlargement of the spleen, and diminution of the liver, exaggerated knee-jerk, ankle-clonus, and tetanic rigidity of the lower extremities. Pulse 60, temperature 96.8° F. (36° C.), slight hæmorrhages from stomach and bowels, and death. There was no albumen in the urine, nor leucin nor tyrosin, but crystals of bilirubin were present in the sediment. Numerous clear hyaline and granular casts were also found. He does not share the views of Klebs and Eppinger that the disease is produced by special microbes, since he could detect none in the liver and failed in his attempts at culture. He is inclined to think that bacteria of unknown habitat produce some chemical body which acts on the parenchyma of the liver. Hayward ²⁸⁷_{Oct. 1, 1900} reports a case in a pregnant woman,

with miscarriage and death. Dörfler²⁶⁵ records a case occurring during the course of typhoid fever. The anatomical diagnosis was: typhoid fever (cured); closure of cystic duct by gall-stones, which were also present in the bladder; acute yellow atrophy; universal icterus; hæmorrhages in gastric mucous membrane; acute parenchymatous nephritis; splenic enlargement. It would seem that the liver, owing to the biliary stasis, afforded a more favorable condition for the typhoid bacilli, and thus may have originated the atrophy. Mueller²⁶⁷ regards the following case, occurring in a boy 11 years old, as undoubtedly an example of acute yellow atrophy. Symptoms: lassitude and headache for a day, then vomiting; restlessness; violent pains in right side; extreme noisy delirium. Temperature subnormal; respiration quick and labored—30 per minute; pulse small and thread-like—120 per minute. Skin yellow; lungs normal. Percussion over liver caused pain, extending vertically for 2 inches; tympany over left lobe; splenic dullness increased. Stool clay-colored; urine contained albumen, bile, leucin. Cure followed treatment with euonymin, irisin, potas. bicarb., tr. podoph., leptandrin, soda pot. tart., and inf. rhei comp. David Harkie²⁶⁷ gives several reasons for doubting the accuracy of the diagnosis in the above case.

Hydatid Cysts.—Eichorst¹¹⁴ has observed a peculiar symptom in 2 cases of hydatid which he believes to be of great value in the diagnosis of impending or actual perforation of the cyst. It is a highly characteristic aromatic odor, resembling that of boiled plums. In one patient it was observed in the matter vomited at the time that rupture took place into the gastro-intestinal tract, and re-appeared on the breath some days later, before rupture into the respiratory tract. Among 4 other cases reported by Galliard,³⁶⁰ 1 occurred on the convex surface. It projected so far into the thorax that it at first was viewed as a pleural effusion. Later it was aspirated, and cough, dyspnœa, pain, and vomiting followed, lasting eighteen days and resulting in death. Post-mortem, the diaphragm was found pushed up to the second intercostal space, and there was almost no lung remaining. The author explains the fatal result on the ground that the walls of the cyst were unyielding and that, consequently, there was great determination of the blood to both lungs to take the place of the fluid removed. He concludes that aspiration of a cyst projecting

into the thorax is dangerous, and that if it be done the fluid withdrawn should be substituted by some antiseptic solution. Potherat²¹² claims that the urine will show biliary coloring matter with nitric acid, whereas in abdominal tumors not connected with the liver this reaction cannot be obtained. Chevallier²⁹⁰ reports a case in which urticaria twice followed aspiration. Rossigneux²¹¹ found, post-mortem, a small cyst in a case of diabetes. There were no symptoms. J. D. Thomas¹ reports recovery in a case in which two-thirds of a bucketful of pus and cyst-matter was removed. Juhel-Renoy³¹ recommends treatment by injection of some parasiticide. He aspirates, then injects the antiseptic (as Van Swieten's fluid), removes it, and finally washes the cavity out several times with boiled water or a solution of naphthol. In a later communication,³ he details a case in which this treatment was very successful. Cases are also reported by Loewenstein,⁵⁰ Orsi,³⁶ and Guilleteau.⁵⁰ Roeser²⁵⁹ gives an analysis of the fluid of the cyst, showing that it varies greatly. Vierordt⁴⁷⁵ writes a quite elaborate article on the multilocular echinococcus. Lebedeff and Andreef⁵⁰ have succeeded in two instances in transplanting echinococcous cysts from man to rabbits by opening the abdominal cavities of the latter and inserting the cyst.

Tumors of the Liver.—Hansemann⁴ has analyzed the cases recorded in the Berlin Pathological Institute from 1880 to 1889, and finds that out of 258 cases only 6 of true primary cancer of the liver, and of these 2 are doubtful. He regards the affection as far more uncommon than is commonly supposed. He details a case in which there were multiple tumors of two distinct types,—adenomatous and carcinomatous. Poulalion⁷ reports a case of the primary affection. A writer²¹⁴ also reports a case interesting because the only symptoms were intense pain and collapse for twenty-four hours before death, from rupture and hæmorrhage. Tatham² found cancer-cells in the vomit of a patient. Sanyoshi²⁰⁰ describes a case which is of interest on account of the physical signs. The tumor occupied the left flank, and extended up to the left pleural cavity through the diaphragm. An area of resonance apparently separated this mass from the right lobe, thus causing it to simulate splenic or renal enlargement. There was no jaundice, hæmorrhage, or ascites till the last. A few small cancerous masses were found in lung. Cuony¹⁹⁷ reports a case which,

to a large degree, became cystic. No trace of echinococci were found. Klemperer²⁴_{Jan.30} describes 3 cases exhibiting, as he believed, three distinct forms of cancer. In the first the liver was much enlarged and hard, with large, irregular nodules. In the second it was slightly enlarged, hard, with indented edge and retracted left lobe. In the third it was greatly enlarged, hard, and smooth. The diagnosis in the second was from cirrhosis, in the third from amyloid or from other non-malignant enlargement. Magny¹⁸⁸_{Mar.3} describes a melanotic cancer weighing 14 pounds. Years before an eye had been removed for causes unknown. No other organ was affected. Stedman⁹⁹_{Oct.1} showed a liver to the Boston Society for Medical Improvement, May 26th, in which the disease was apparently primary. It was not suspected during life. Hodenpyl,⁵⁹_{Aug.1} Moore,²_{Oct.26} and Workman²¹³_{Feb.} also report cases, and Hochenegg²²_{Feb.1} speaks of removal of a cancerous growth involving gall-bladder and part of liver, the woman, months after, being apparently well. Rovighi⁸⁴⁴_{June 7} states that in tumors, especially cancers, which have developed at the hilus or under the left lobe, an arterial murmur can be heard all over the organ, due to stenosis of the hepatic artery or to compression of the abdominal aorta.

De Ruyter²²⁶_{H.1; May 19}⁴¹ describes a congenital lymphosarcoma, affecting also the supra-renal bodies and causing death through dyspnœa. Nothnagel¹¹³_{June 22} exhibited a patient with a hard tumor, in whom Legal's test gave positive evidence of acetone in the urine. For that reason, and because the patient probably had a melanotic sarcoma of the optic bulbs, he regards the tumor as sarcomatous. West²_{Oct.25} narrated a case of fibrosarcoma occluding the vena cava and hepatic veins and involving the heart. Martinotti³⁶⁴_{May 8} describes an angioma in a female 5 months old, and states that it is the second case in which this affection has been found in children.

DISEASES OF THE GALL-BLADDER.

Gall-Stones.—There has been much discussion during the past year as to the therapeutic value of olive-oil. Early,¹⁹_{Nov.19} Fisher,⁶⁶³_{Sept.} Landon,⁵⁸_{Aug.16} Skelly,⁸²_{Feb.16} Fenn,⁴⁴_{Dec., '99} Davis,¹⁸⁶_{Dec., '99} Valin,¹²²_{Apr.} G. Sée,³¹_{Jan.22} and Rosenberg,¹⁶_{Dec., '99} all recommend it more or less highly. On the other hand, Gubb,²²_{Nov.19} Meyer,⁴_{Dec.1, '99} Ewald,⁴_{Dec.1, '99} Kichkine,⁶⁷_{Dec.20, '99} regard it as useless. Thomas S. Burbank⁴³_{Aug.} found that its administration to four persons not suffering from hepatic colic was

followed by the passage of large, dark-green or whitish masses composed of soap and oil. Biliary calculi, on the other hand, contain 70 to 80 per cent. of cholesterin. Kums²⁶ recommends subcutaneous injections of ether or of ether and alcohol. Harley⁴¹ demonstrated before the Tenth International Congress his method of treatment by pressure on the fundus of the bladder with the hand. So soon as the stone is dislodged, the gall-bladder diminishes in size and bile appears in the stools. Icterus disappears in a few days. He cautions against the use of this method if ulceration be present. Christoffe⁸² advises campho-phénique in doses of 4 to 20 grains (0.26 to 1.3 grammes) every four hours. He gives it in sulphuric ether and syrup of ginger. A. V. Meigs¹¹² reports a case with occlusion of the cystic duct, a false passage from the gall-bladder to the duodenum, and multiple hepatic abscess. Aufrecht³²⁶ gives a case in which the liver was perforated, followed by hæmorrhage, rupture, and death. Cutter⁸⁰ showed to the Boston Society for Medical Improvement, November 25, 1889, specimens from a case of impacted calculi and ulceration in the duodenum. C. H. Miles⁶ reports a case of acute intestinal obstruction from a calculus in a woman 77 years old. There were no symptoms until the stone reached the lower end of the ileum. Abdominal manipulation, hot fomentation, and opium were followed by recovery. Taylor⁶ describes a case of biliary fistula in which four sinuses were present in the abdominal wall, all discharging clear, bile-stained serum, and at times calculi. The motions were of good color and the urine not bile-stained. Terrillon³ reports a successful case of cholecystotomy, and Terrier³ one of cholecystenterotomy which afterward died from cancer of the pancreas. Desplats²²⁰ describes a case of biliary lithiasis with exophthalmic goitre and cardiac liver cirrhosis, relieved by treatment at Vichy. Gutmann⁴ showed a large gall-bladder with calcified walls in a patient who died from nephritis. There were no symptoms referable to the liver. W. A. Edwards¹⁴⁷ found, in a man dead of pneumonia, eighty-eight gall-stones, the total weight being 490 grains (32.75 grammes) and that of the largest 234 grains (15.5 grammes). During life, fullness was noticed in the region of the bladder and on auscultatory percussion a crackling sound was heard. There were no liver symptoms.

Osler⁹⁶ in an article on hepatic intermittent fever, gives a series

of cases from his own experience. He thinks that it is not obstruction alone that causes the symptoms, but that probably ferment-producing agents, micro-organisms, also act. The differential diagnosis is from suppurative cholangitis. The points are increased tenderness in the hepatic region, with possibly enlargement of the bladder, the more frequent return of the paroxysms, and in some instances the irregularly remittent character of the fever and the less intense jaundice, especially after the paroxysms, in the latter condition. Again, if suppuration be present, there are rarely the prolonged periods of apyrexia, the freedom from distress, and the general betterment which we see in cases of simple gall-stone obstruction. There may, however, be great difficulty in deciding between the two conditions. In chronic obstruction from a cancerous mass in the head of the pancreas, or in the lymph-glands, there are occasional rigors due to catarrhal suppurative cholangitis, but the sequence of symptoms would enable one to decide between this condition and gall-stones. The cases are often mistaken for malaria. The negative condition of the blood in these cases may be very suggestive, as in 2 in which the absence of Laveran's organism led to a revision of the diagnosis.

Tumors of the Gall-Bladder.—Cones¹⁵ found a fibrous tumor occupying the place of the gall-bladder and surrounding the duodenum. On cutting into it a little pus escaped, but the walls of the bladder could not be found, nor were calculi present. The duct must have been pervious, since bile was present in the intestine and there was not severe icterus. The trouble began apparently with catarrhal jaundice. Appetite increased, with craving for indigestible food, some jaundice, severe epigastric pain, and palpable tumor.

J. H. Musser,⁹⁹ from a study of 100 cases of primary cancer of the gall-bladder, concludes that it is not so rare as supposed. It occurs in females nearly three times as often as in males. The larger number of cases occur before 60. Calculi are a possible exciting cause, especially in persons predisposed to carcinoma. The organ is not generally much enlarged, save by a process of secondary dilatation. Metastasis is not wide-spread, and neighboring organs are involved by continuity of structure. Adhesions to adjacent organs and ulceration and perforation are not common. Pain, jaundice, emaciation, cachexia, and tumor are present in the larger

number of cases, while indigestion, vomiting, constipation, or diarrhoea and ascites are of more frequent occurrence than is usually thought. Pain occurs in about 62 per cent. of the cases, at first ill-defined; it soon becomes localized to the right hypochondrium, and is lancinating in character. Jaundice is present in about 69 per cent. of the cases, and gradually increases in intensity. Tumor in about 68 per cent. of the cases situated in the region of the gall-bladder, to the right of the umbilicus (when it is in the latter location the liver is usually enlarged). The tumor is hard or firm and tender, and painful. The disease is almost always progressive, and tends toward a fatal ending. Complications are due to occlusion of the ducts and secondary effects on the liver and gall-bladder, ulceration and perforation of gall-bladder, the symptoms arising from metastasis. The duration is short, the average being six and two-thirds months. Death is due to exhaustion, peritonitis, metastasis, or biliary obstruction. He draws the following conclusions from a study of 18 cases of cancer of the bile-ducts: It is less frequent than cancer of the gall-bladder. It occurs equally in both sexes. Gall-stones are less frequent when the ducts are the seat of the disease. The gall-bladder is not much enlarged, and only by dilatation. Metastasis is not common and not distant. Adhesions, ulceration, and perforation do not occur. Jaundice is more frequent than if the gall-bladder be affected, and contributes largely to the short duration of the disease. The sequelæ of jaundice and accidental or intercurrent disease are the cause of death. A tumor is present in a smaller ratio of cases than when the gall-bladder is the seat of disease. It is never as large as in the latter condition. H. P. Loomis⁵⁰ reports a case of primary cancer of the gall-bladder in a woman of 46 years, in whom no symptoms occurred until within four months of death, except an attack of "gall-stones." No tumor was detectable. The gall-bladder was found transformed into a cancerous mass the size of a small apple, in the centre of which were several small calculi. Continuous with this mass a second mass extended into the liver, which, however, contained no scattered, independent nodules. The stomach and pancreas were uninvolved. Finlayson and Coats²¹⁸ report a case occurring in the common bile-duct, leading to rupture of the bladder and death.

DISEASES OF THE INTESTINES AND PERITONEUM: CHOLERA.

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DIARRHŒA.

Dujardin-Beaumetz⁶⁷ treats of diarrhœa and constipation as different results of intestinal putrefaction and sepsis. In constipation, which is the chronic form of this condition, the nervous symptoms, especially irritability and hypochondria, are due to intestinal putrescence and absorption of toxic products. In diarrhœa, which is the acute form, there is the sudden effort to expel toxic matters with vomiting and purging. Intestinal antiseptics is, therefore, the remedy in both cases. In diarrhœa he recommends the salicylate of bismuth, which contains free salicylic acid, in the following formulæ:—

R Bismuthi salicylatis,
Magnesiæ,
Sodii bicarb., ʒʒ 10 grammes (2½ drachms).

M. Div. in pulv. xxx.

R Bismuthi salicylatis,
Cretæ prep.,
Calciæ phosphat., ʒʒ 10 grammes (2½ drachms).

M. Div. in pulv. xxx.

R Bismuthi salicylatis,
Naphthol β,
Saloli,
Pulv. carbo ligni, ʒʒ 10 grammes (2½ drachms).

M. Div. in pulv. xxx.

An infusion of the *Hysterionica baylahuen*, a plant which is antiseptic and astringent, is recommended,⁶⁷ although only one specimen has been introduced from Valparaiso into Europe.

The use of arsenite of copper in intestinal affections has been advocated by Aulde, and others have followed him in testifying to

its merits. The method of administration is to dissolve a tablet of $\frac{1}{100}$ grain (0.00065 gramme) in 4 or 6 ounces (120 or 180 grammes) of water, and give of this one teaspoonful every ten or fifteen minutes, for the first hour, and thereafter a teaspoonful every hour. With this treatment many cases are reported to have improved in a few hours, which, under other treatment, would have lasted several days. But in the case of this drug, as well as of many others, too much haste has been used in giving it a prominent place before its merits have been sufficiently tried. In forms of diarrhœa consequent upon certain infectious diseases, where astringents, etc., have little or no effect, Cimbali⁹_{Apr. 19} has used with great success hypodermatic injections of 15 drops of chlorodyne; the patient experiences great relief, and the number of stools rapidly diminish.

In cases of long-standing diarrhœa, powders of guarana, given twice daily, have been followed by good results.⁸⁰_{Apr. 15}

Carbolic acid, used with a view to intestinal antiseptis, has been tried with discouraging results,—due, without doubt, to the fact that a sufficient quantity for its antiseptic properties could not be given. That it has a beneficial action is a general belief, founded, doubtless, on its well-known power of quieting the peripheral nerve-filaments, producing local anæsthesia. It is of benefit only when the bowels are thoroughly emptied, so that it can act upon the mucous membrane itself. Clark, of London,¹¹²_{Dec. 70} uses it as an enema, 1 grain to 6 ounces (0.07 gramme to 180 grammes), only after a previous injection of potassium chlorate, 5 grains to 1 ounce (0.33 gramme to 30 grammes), to remove the adherent mucus.

Pepper⁹_{Nov. 20, 70} mentions the prompt benefit derived from small astringent and sedative injections, even when careful examination shows that there is no ulceration of the rectum. Not more than 2 ounces (59 cubic centimetres) of liquid, and of the strength of 2 grains (0.12 cubic centimetre) or less of sulphate of zinc to 1 ounce (29 cubic centimetres) of water, are thrown into the rectum once or twice daily. Much good in such cases is to be attributed to the careful regimen prescribed and followed.

Eccles³¹_{Aug.} recommends, in the treatment of chronic diarrhœa, absolute repose, a restricted diet, the maintenance of equable temperature in the dwelling, and the employment of massage. He

also has used successfully moderately large doses of salol. The use of podophyllin in that form of diarrhœa dependent on deficient secretion of the various intestinal juices is advised as administered in the following prescription ¹¹²_{Oct.}:—

R Resinæ podophylli, gr. j (0.07 gramme).

Spts. rectific., gr. 3j (4.00 grammes).

M. Sig.: One drop in a teaspoonful of water every five hours to a child under 2 years.

In another form of diarrhœa characterized by mucous passages, mercuric bichloride is used with success, as follows ¹¹²_{Oct.}:—

R Hydrarg. bichloridi, gr. $\frac{1}{4}$ (0.012 gramme).

Aq. destillatæ, 3ij (60.000 grammes).

M. Sig.: One drachm (4 grammes) every five hours.

Begg ³⁶_{Sept.} states that, after much clinical experience in chronic tropical diarrhœa, he is led to believe that it is due to an organism which renders the intestinal contents unfit for absorption. He believes that santonine, 5 grains (0.33 gramme) at bed-time, is inimical to the life of this organism: he gives the dose in a teaspoonful of olive-oil, at bed-time, for six days.

DYSENTERY.

Epidemics.—An epidemic among the French troops at Luneville in July and August, 1889, is minutely described by Archintre. ²⁴³_{Aug.} Typhoid fever, measles, and scarlet fever had prevailed during the preceding winter and spring. The onset was sudden, it extended rapidly, and lasted fifty-five days without interruption; no effort to arrest it had any success. The regiment was moved on August 5th to Corcieux, in the Vosges, but the epidemic lasted until the 21st, although all the conditions of air, soil, water, and lodging were completely changed. Out of 619 men, 186 (30 per cent.) were ill; 16 per cent. of these were young soldiers; 4 per cent. had long been in the ranks.

The *etiology* of dysentery is still so obscure that all facts bearing upon it are of value. The following were the meteorological and other conditions preceding and accompanying the epidemic: excessive heat for two months, with sudden lowering of the temperature just before the outbreak; exposure of the men to great heat during their manœuvres; the drinking-water was obtained from the river, from wells, and from a spring, and contained numerous bacteria.

The *soil* in the immediate neighborhood of the barracks was manured with dried fæcal matter; in the months preceding the epidemic excavations had been made for the construction of a new building, and it was in the barracks nearest this excavation that the first case occurred.

In proof of *contagion* the following facts are noted: in seventeen days 25 soldiers were ill in one building, while 6 only were attacked in an adjoining building; during the sixteen days following the cases were scattered in the two buildings, the larger number being in the one last infected. Proximity to the source of infection (the excavations) may account for this mode of development.

The *symptoms* were generally mild. The attack in 2 cases was preceded by acute articular rheumatism. Relapses were quite frequent; one patient had four successive relapses. The duration varied from sixteen to eighty-five days. Three cases out of 362 proved fatal.

The prophylactic measures employed to suppress disease were: suspension of cold baths, lessening of work, avoidance of cold, especially at night; no fruit allowed; the constant wearing of flannel abdominal bandages; the use of boiled water; disinfection of closets, utensils, etc.; careful and generous diet; and immediate treatment of diarrhœa and debility.

The *treatment* was by evacuants, sulphate of soda having the preference, 10 to 30 grammes ($2\frac{1}{2}$ to $7\frac{1}{2}$ drachms) being given during the day in three or four doses; calomel was given in obstinate cases, and ipecac in those still more rebellious. Milk was the only food.

In contrast with the slight mortality of this epidemic, one recorded by Daniels¹⁵ is of interest where the mortality was 48 per cent. This was called scorbutic dysentery and occurred among 120 Polynesian emigrants on the voyage to Fiji, and continued after their arrival at quarantine. As the quarantine station was on an uninhabited island, opportunity was afforded of studying the spread of the disease. The conclusions drawn are: 1. That the disease was contagious, spreading from person to person when confined closely together, but not to persons at a distance. 2. That there is a variable latent period of ten or twelve days or less. 3. That the contagion exists at every period of the disease, and is not contained in the alvine evacuations alone. No cause is

assigned for the original outbreak. There was no history of exposure; the author believes it to have been due to the consumption of fish, which was in a state of decomposition from the intense heat of the weather. Stomatitis with ulcers was a common complication. Arthritic symptoms, resembling acute rheumatism, occurred in convalescence in 5 cases.

Pearce²⁶_{Oct. 1} gives an interesting history of an epidemic on the ship "Arabia," between Calcutta and Demerara. The ship leaked badly, and the decks, both upper and lower, were wet day and night, where the passengers (natives) slept. The mean lowest night temperature varied from 66° F. (19° C.) on deck to 85.7° F. (29.50° C.) below deck. The largest number of cases in any week occurred when the mean night temperature was the lowest,—66° F. (19° C.) on the upper deck, 78° F. (25.55° C.) below. The lowest temperatures, with this exception, ranged from 70° to 85.7° F. (21° to 30° C.). Out of 404 persons, 56 were ill; some had mucous diarrhoea only; 3 deaths occurred from dysentery and 1 from empyema. All the cases which occurred were treated with ipecac; 20 to 30 grains (1.30 to 2 grammes) were given at the first onset, and in one hour 10 to 20 grains (0.65 to 1.30 grammes); and in another hour 10 grains (0.65 gramme) were administered. Hot-water fomentations were kept over the abdomen. Vomiting was rare.

Etiology.—Osler⁷⁶⁴_{v. 1, p. 64} gives a history of the discovery of the amœba coli of dysentery by Losch. Kartulis found the parasite in 500 cases of dysentery and in all the cases of liver abscess examined. The parasite was seen by Massintin in cases of chronic dysentery, chronic intestinal catarrh, and in typhoid fever. Osler reports a case of abscess of the liver following dysentery in which the amœba was found in the pus drained from the abscess. The amœbæ from the abscess were somewhat larger than those described by Kartulis; they were circular, sometimes ovoid; but while in movement had an irregular outline. The alterations in contour and change in locality were as remarkable as in some forms of pond amœbæ. Motion continued active for hours, in two instances for ten hours. In the stools the amœbæ were rare in the brownish liquid; more frequent in the small sloughs passed. In form and other characters they were like the organisms in the pus from the liver-abscess. This question is of great interest, as the

ameba had not before been found in the dysentery of this country. The patient in this instance had lived five years in Panama before going to Baltimore.

Lemoine²¹¹_{Dec. 22, '90} gives a *résumé* of the arguments for and against contagion; he then gives the clinical history of a case, from which he concludes that infection resulted from sitting upon a close stool which had been used by a dysenteric patient; he believes that this is a common mode of propagation.

Treatment.—The vexed question of the treatment of dysentery has received no great amount of new light in the past year. The older methods are notoriously inadequate, being nothing more than the administration, by the mouth, of drugs which either do not reach the seat of the disease in any appreciable quantity, or else, by their astringent and irritant effects on the gastro-intestinal mucous membrane, are positively injurious. The older treatment, also, by astringent rectal injections, cannot be considered as wise or beneficial. Belief in the parasitic origin of the disease must lead to the hope that antiseptics and cleansing of the colon are the methods which will in time give the best results.

Fairbairn¹⁵⁷_{Oct. '90} has published a paper advocating the use of large and frequently-repeated rectal enemata. The patient should lie on the right side and 1 to 4 pints of water, at a temperature of 100° to 105° F. (37.77° to 40.55° C.), should be thrown into the bowel with an alpha syringe. The author speaks of this treatment as *irrigation*. He does not dwell upon the value of adding antiseptics to the water injected.

Cimbali⁵⁷_{Apr. '90} advocates the use of salicylic acid, 7 grains (0.4 gramme), and $\frac{1}{8}$ grain (0.01 gramme) of opium, every four hours, in dysentery. He has found all the symptoms to disappear in four or five days. He has used this same treatment successfully in chronic intestinal catarrh.

A new remedy is introduced by Easmon.²⁶_{Dec. 1, '90} This is *Newbouldia laevis*, a tree of the west coast of Africa. A decoction of the bark is used internally and externally in Sierra Leone, for malarial diseases and for post-partum hæmorrhage. The author tried it in dysentery at Acca and Lagos, in India, and acquired great confidence in its efficacy. He has used the decoction and the fluid extract.

Carageorgiades, of Limassol, Cyprus, corresponding editor,

advises the infusion of herba rubi idæi, 2 to 6 drachms (8 to 24 grammes) a day, or preferably the powder, 10 to 30 grains (0.65 to 2 grammes), every three hours, in dysentery and catarrhal affections of the intestines.

The value of saturated solutions of magnesium sulphate in the treatment of acute dysentery is still urged by many reporters. The method is as follows: To an ounce (30 grammes) of a saturated solution of magnesium sulphate add 10 drops of dil. sulph. acid; this is given every hour or two until it operates freely and the stools have become feculent, free from blood and mucus, and the pain and tenesmus relieved. Leahy⁶ reports 95 cases treated at Hyderabad, India, by this method. The number of days under this treatment before the dysenteric symptoms disappeared was never more than five, and in many cases one or two only. Astringents and opium were given after the blood and mucus disappeared from the stools. The plan must be remarkably efficacious if the facts are to be understood as they appear in this article.

Harris⁶ advises the use of ipecacuanha-powder which has been deprived of emetine. The ipecacuanhic acid is at first abstracted, but subsequently re-mixed with the powder after the emetine has been removed. Patients thus escape the nausea and prostration of powdered ipecacuanha.

Lemoine⁶⁷ has treated 54 cases of dysentery by enemata of corrosive sublimate with the happiest results. The strength of the solution was 1 to 5000, of which 6 ounces (180 grammes) were injected three times a day; later, a solution of 1 to 3000 was injected twice daily. The fluid was not retained usually longer than ten minutes. Improvement showed itself, as a rule, at once; acute cases were cured in from one to three days, and in the acute attacks of the chronic form a cure was effected in one day. In no case was there any sign of systemic poisoning.

Asbery⁶⁴⁷ advocates ice-water flushing of the rectum.

Rectal injections of cup. sulph., 10 grains to 4 ounces (0.65 gramme to 120 grammes) of water, have been used successfully by W. Easby²¹⁸ in dysentery with profuse hæmorrhage, when other remedies had failed. Enemata of $\frac{1}{2}$ ounce (15 grammes) of alum in 10 ounces (300 grammes) of water, injected twice daily, have been used with success in obstinate cases of dysentery, with marked benefit and a disappearance of all symptoms, by H. F. Norbury.⁶

CONSTIPATION.

Nothnagel ¹¹³_{Mar. 19} considers massage of the abdomen, electricity, and abundant exercise as the three most important elements in the treatment of habitual constipation. The massage, he urges, can *not* be self-administered, but an efficient substitute is a metal ball, weighing from 3 to 6 pounds, which should be rolled over the course of the colon every morning for from five to ten minutes, beginning in the right iliac region. Electricity, in the galvanic or faradic form, preferably the latter, is applied over the colon. Exercise should be followed regularly, not only by walking and riding, but also by gymnastic exercise in one's room. All these methods are slow of action, though he does not doubt success if earnestly adhered to for some time.

In the meantime temporary measures must be adopted to avoid faecal accumulations, and he thinks enemata are preferable to drugs; when a laxative is imperative he prefers a vegetable product, a favorite prescription being as follows:—

R Podophyllin.,	gr. iv (0.25 gramme).
Ext. aloës,	
Ext. rhei,	ââ gr. xlv (3.00 grammes).
Ext. tarax.,	q. s.
M. et ft. pil. no. xl.	
Sig. : One or two at bed-time.	

Flatau ⁸²_{Nov. 20} has introduced a new method for the treatment of constipation due to torpor of the colon. His plan is to apply by insufflation 3 grammes (45 grains) of boric acid to the mucous membrane of the rectum. In from one to three hours strong peristalsis is set up. One feature urged is that the patient does not become so accustomed to it as to cease to be affected by it, but in time normal peristalsis is established.

The application of massage to the abdominal walls of children for constipation is advised by Carnitzky. ⁶⁷_{Sept. 15} The applications are made principally over the left side of the abdomen for the space of four or five minutes. He has found by this treatment that purgatives are unnecessary, and that normal voluntary movements are instituted.

Bolin, ⁵⁹_{Oct. 25} in an elaborate article, describes a series of special gymnastic exercises which have in view the strengthening of the abdominal muscles in constipation due to torpor of the intestines, etc.

Cumulative constipation, or the condition where the rectum, even though there is a daily evacuation, is not entirely emptied, is a subject which has of late years received some attention. This condition, which is said to be by no means rare, requires most careful attention and treatment. Field,⁹⁹ who was one of the first to call attention to its existence, advises the use of a compound rhubarb pill every hour until defecation is complete.

Lutaud¹ uses the following formula for constipation in chlorotic and dyspeptic women:—

R Citrate of iron and ammon.,
Fl. ext. cascara sagrada, āā 40 parts.
Saccharin, 1 part.
Diluted with water, 4000 parts.
The dose is a teaspoonful before meals.

Watkins gives renewed support to the following formula as an enema for constipation after gynæcological operations:—

R Magnesæ sulph., ʒij (60 grammes).
Glycerini, ʒj (30 grammes).
Aque, q. s. ad ʒij (60 grammes).—M.

ULCER OF THE DUODENUM.

As the diagnosis of duodenal ulcer is admittedly difficult, all recorded facts in connection with the subject are of interest.

Myers² gives an account of a case of perforating ulcer of the duodenum. The symptoms were intense pain in the abdomen, for which the patient was admitted to hospital. Death took place from collapse on the following day. A perforated ulcer was found on the anterior wall of the duodenum immediately below the pylorus.

King¹⁷⁰ gives the history with autopsy of a case of duodenal ulcer. The man, aged 68, suffered for years with attacks of pain in the epigastrium. Coffee-ground matter was vomited. In a severe attack, in October, 1887, coffee-ground fluid was passed by the rectum. He died in December, having had distended and tender abdomen, with pain through the whole abdomen. An ulcer was found on the anterior wall of the duodenum, 1 inch below the pylorus, which had perforated through all the coats. Adhesions existed between the stomach, duodenum, and neighboring structures.

Biggs¹ showed specimens of duodenal ulcer. The patient had dementia and articular rheumatism, but was not supposed to

be ill, and died in seventeen hours. The ulcers had perforated in two places.

Lesage¹⁵² contributes an interesting history of a girl, 16 years of age, who had suffered for seven years with dyspeptic symptoms. For five years she had intense suffering in the epigastric region. Intense pain began immediately after eating, but reached its maximum in two hours. There was no nausea or vomiting and no melæna. Death took place from exhaustion due to her unwillingness to eat for fear of exciting the pain. The stomach was normal; there were no ulcers in the duodenum, but its mucous membrane was inflamed and of an intensely violet color. This history is of great value as showing the connection between duodenitis and pain after food. To recognize an ulcer in the duodenum, more symptoms than pain are necessary.

Hunter,⁶ read a communication on the pathology of duodenitis and ulcer after external burns. As the result of experiments with toluylendiamin, which was injected into the circulation of dogs, he concludes that duodenitis is probably due to the irritant action of certain ingredients of the bile upon the duodenal mucous membrane, and that these products were formed from the disintegration of the burnt tissues which entered the blood and were subsequently excreted with the bile.

Southam,⁶ reports a case of duodenal ulcer in a man, aged 38, who had had extensive burns about the face. Before death, on the twelfth day, he complained of pain and tenderness in the epigastric region. The duodenum near the pylorus contained two well-defined ulcers.

GASTRO-INTESTINAL FISTULA.

May⁸⁴ gives the history of a patient in whom there was a fistula, the size of a man's fist, from the stomach into the transverse colon, caused by carcinoma of the stomach. This result is extremely rare, as in 507 cases of carcinoma of the stomach only 21 cases, or about 4 per cent., are reported. The patient took large quantities of meat and digested it, and, notwithstanding that the small intestine took no part in the digestive process, at no time were there lenteric stools. The man lived four months. A correct diagnosis was made during life by the injection of gas into the colon, and also by the fact that in washing out the stomach with cool water it was passed immediately per rectum still cool.

ABSCESS BEHIND ASCENDING COLON.

Eisenlohr⁶⁹ reports an obscure case in which the symptoms were profuse diarrhoea, epistaxis, light icterus, and, later, ascites and fluctuation in the abdomen, with high evening fever. The patient died, and on post-mortem there was found a sac, situated back of the ascending colon, filled with a thick, yellow mass, which had become, to a great extent, absorbed.

APPENDICITIS, PERITYPHLITIS, ETC.

Bridge¹¹²³ writes on "Inflammation of the Appendix and Cæcum, and the Duty of the Physician Regarding Them." He believes that surgical interference is necessary: 1. In cases of acute inflammation in the cæcal region, with rather protracted high temperature and with distinct induration, sensitiveness to pressure, lasting without positive evidence of subsidence for two days, or three or four days from the beginning. This rule becomes urgent if these conditions are aggravated after two days, if signs of general peritonitis occur, or if there is rapid, weak pulse or rapid breathing. 2. In cases of acute severe inflammation in the region of the appendix without induration, and in cases of acute localized peritonitis with marked constitutional symptoms. 3. In cases where a large, tender induration develops rapidly, with high fever, etc. 4. In subacute or chronic forms, with larger and distinct induration, increasing in size. 5. In chronic appendicitis, with occasional exacerbations, even if there is no induration.

Fitz,¹¹²³ in the discussion of this paper, spoke of the frequent occurrence of appendicitis. Many cases are so mild as never to require treatment; this is shown by the fact that *one-third* of all the post-mortems have lesions indicative of an appendicitis at some remote period, although there is no history of it during the patient's life. In the last four years, from 72 cases seen, the following conclusions can be drawn: Twice as many males as females are affected; recurrent attacks show a percentage of 44 (11 per cent. only in the larger series collected previously); surgical treatment in severe cases does not shorten the period of illness; 74 per cent. recovered; 26 per cent. died. One-half were treated medically,—11 per cent. died; one-half surgically,—40 per cent. died. Spontaneous evacuation of pus took place in 7 per cent. of the cases. The rules for surgical interference are: to operate, if rising pulse and tem-

perature, increasing distension and spreading pain, with or without a tumor, and to operate if there is a tumor, with or without urgent symptoms.

In regard to the mode of perforation of the appendix, and the fact that the opening is sometimes not at the point of impaction of the foreign body, Talamon⁸¹ offers the following explanation: The foreign body becomes engaged in the tube and closes the orifice; the walls of the appendix are pressed upon; the circulation is disturbed, mucus accumulates below the obstruction, and the appendix is distended, causing further pressure and diminishing vitality of the walls; micro-organisms multiply in the retained, stagnant secretion, and aid in the putrefaction of the fluid and in the destruction of the appendix-wall.

The association of local tuberculosis with appendicitis is referred to by Musser.¹¹²³ In one case he attributes the appendicitis to the closure of the orifice of the appendix by an enlarged tubercular gland, with retentive inflammation and abscess. An operation resulted successfully, but death occurred later from pulmonary and intestinal tuberculosis. Michon²¹¹ showed specimens of intestinal tuberculosis limited to the cæcum and appendix.

Anatomical reasons for the accumulation and drying of fecal matter in the cæcum with resulting irritation and inflammation are given by Kelly.³²

Porter⁴⁶² concludes that in every instance, anatomically speaking, the primary origin of the pathological process is outside the cavity of the peritoneum. When intra-peritoneal suppuration occurs it is secondary to the extra-peritoneal. The external iliac or lumbar operation is, therefore, to be preferred. If the peritoneal cavity is involved, lateral laparotomy is demanded. These views are opposed to those which more generally prevail at the present time.

Biggs⁴⁶² gave the results of his study of the normal and pathological anatomy of appendicitis. In nearly three-fourths of the cases the appendix extends inward and backward; in a little more than one-quarter it lies back of the cæcum, or behind the cæcum and ascending colon. In all cases of general peritonitis from vermiform perforation the appendix (with one exception) was free in the abdominal cavity. This occurs in one-fifth or one-fourth of all cases. When the appendix floats free, a contained

foreign body is easily expelled into the cæcum by the intestinal movements, and no harm results; if no such escape is possible, inflammation sets up; this extends to the peritoneum, and thence to the retro-peritoneal connective tissue; perforation may occur and abscess may form.

Talamon³¹_{Oct} explains the sudden onset of pain in the right iliac region, with vomiting, by the sudden impaction of a scybalous mass in the appendix, which gives rise to an "appendicular colic," analogous to hepatic or renal colic. This may happily end by the escape of the obstructing plug into the cæcum, or it may remain and excite inflammation with perforation. Cases of this kind are not uncommon.

Treves⁶_{Oct} advises against the removal of the appendix in operating for acute inflammation in the cæcal region. The less done the better, he says, in handling this acutely-inflamed district. Up to date of writing, he had had no death after an operation.

An interesting case is reported by Dalton.⁵⁶⁸_{May, '90} Through a lateral incision three-fourths of the appendix and two pieces of the gangrenous omentum were discharged. Subsequently an opening was made into the cavity of an abscess, between the tenth and eleventh rib, in the axillary line; from this a necrosed mass of tissue escaped, which proved to be the entire gall-bladder. The patient recovered. Dalton, in another case, made an opening into a right iliac tumor; pus and two or three sections of tape-worm escaped. The patient died, and at the autopsy a perforated appendix, an abscess of the liver, and a tape-worm in the intestines were found.

Stanton,²⁰⁷_{June, '90} had a case in which the abscess ruptured into the intestines; it subsequently filled and was emptied by aspiration; again, later, pus was discharged by the bowel and the patient recovered.

Coe,¹_{Sept. 17, '90} reports a case of sudden death in a child, in whom the disease had not been suspected. There had been slight fever and vomiting, which ceased after a movement from the bowels. The child died while playing. A perforation of the appendix by a fæcal concretion and fetid purulent peritonitis were found.

The curious results of suppuration in the cæcal region are illustrated by 2 cases: One by Grawitz,⁴_{Aug. 12, '90} in which a perityphlitic abscess burrowed its way upward into the pleural cavity. The

pleural fluid was found mixed with fæcal matter. In the other, reported by Coats, ⁶_{Aug. 21, '98} the abscess made its way to the left side, then upward to the diaphragm, which it perforated, inducing pleurisy of the left side.

Homans reports ⁹⁹_{Jan.} 26 cases, with many interesting comments. He speaks of the difficulties of diagnosis and of arriving at a decision as to the necessity of an operation. The severe cases need early operation, the mild ones do not. Hartley ⁵⁹_{Apr.} examined 15 cases, and gives an analysis of the anatomical peculiarities, symptoms, etc.

Rendu ²¹²_{Apr.} and Owen ⁶⁶³_{May} record cases of hepatic abscess following appendicitis with abscess. Multiple abscesses of the liver resulted from a case of ulceration of the mucous membrane of the cæcum and appendix, with outside inflammation.

INTESTINAL ANTISEPSIS.

Cantani ⁴¹_{No. 4} says that treatment by disinfection of the intestinal canal has two objects, the one to get rid of the micro-organisms, the other to eliminate their products,—ptomaines. It is doubtful if remedies by the mouth reach the intestines; only those insoluble or slowly soluble in the stomach are of use. Charcoal in large doses, 3 ounces (90 grammes) daily; naphthalin; iodoform, 15 grains (1 gramme) daily; and bismuth salicylate, are to be preferred. Carbolic acid, mercuric chloride, and other drugs are poisonous in large doses, and too readily absorbed by the stomach.

The best results are obtained by rectal administration; enemata readily pass the ileo-cæcal valve. Alum, salicylic acid, thymol, aseptol, sulpho-carbolate of zinc, boric acid, hydrochloric acid, the sulphites and hyposulphites, tannic acid and carbolic acid, can be employed. The last two are the most useful. In typhoid fever, tannin enemata diminish meteorism and are otherwise of service; tannin destroys bacterial life and renders ptomaines innocuous. An abortive action in early typhoid may be secured with an enema of 1 gramme (15 grains) of hydrochlorate of quinine, 10 to 50 grammes (2½ drachms to 1¾ ounces) of pure carbolic acid, in 2 litres (2 quarts) of cold water.

THE PHYSIOLOGICAL EFFECTS OF RECTAL IRRIGATION.

Voronine ⁵⁸⁶_{No. 41, '98} has examined the effects of rectal douches with cold and cool water. The water was at the temperature of 59°

to 61° F. (15° to 16° C.), or of 72.5° to 74.7° F. (22.5° to 23.5° C.), and the duration of the injection was one and one-half to three minutes. The effects noted were:—

1. The tactile sensibility, examined with the compass of Weber, was increased after a douche of the temperature of 72.5° to 74.7° F. (22.5° to 23.5° C.), the increase being greater if the irrigation lasted one and one-half minutes; less, if three minutes. It was lessened after a colder douche of 59° to 61.2° F. (15° to 16° C.), the effect being more marked if the irrigation was prolonged.
2. The muscular force, determined by the dynamometer of Collin, was increased under the influence of cold rectal injection of 59° to 61.2° F. (15° to 16° C.), lasting three minutes.
3. The time necessary to cause the cutaneous impressions (symptom of Dujardin-Beaumetz), examined after the plan of Fleming, was longer when warm than when cold injections were employed.
4. The tendon reflexes were enfeebled, except that of the knee-cap, which was increased by cold injections.
5. The injections did not diminish intra-abdominal pressure, examined after the plan of R. Wagner.
6. The body temperature was lowered by all the douches.
7. Arterial pressure was lessened.
8. The pulse-tracing was modified.

These observations lead the author to the conclusion that the rectal douche is of service as an antiphlogistic, sedative, tonic, and excitant, and may be used in habitual constipation, hæmorrhoids, spasm of the neck of the bladder, varicocele, vaginismus, prolapse of the rectum and uterus, and atony of the vagina.

RUPTURE OF THE INTESTINE.

Nelson⁶⁵ showed a specimen of rupture of the intestine in two places from a severe abdominal contusion. Death occurred in three-quarters of an hour. The liver and other abdominal organs were not injured.

INTESTINAL OBSTRUCTION.

A case is reported by McCarthy⁶⁶ of acute intestinal obstruction, probably due to embolism of several terminal branches of the superior mesenteric artery. A coil of small intestine was found livid and collapsed, and the arteries supplying it were firmly plugged, thus entirely cutting off the circulation. Cushing⁶⁹

thinks it very questionable if an operation for intestinal obstruction is ever curative, its results being inconvenient and often annoying. So far as prolonging life is concerned, the results of colotomy have been that one-half of the patients die in two or three weeks, and in the other half life is prolonged several months or even several years.

Humphrey,⁶ reports a case of intestinal obstruction in a girl 8 years old, in which abdominal taxis was successfully used. Hutchinson is quoted as saying: "An accurate diagnosis of the cause of obstruction is not possible in 4 out of 5 cases; and the merit of the early use of anæsthetics and abdominal taxis is that, while eminently adapted to many, it is hardly likely to be prejudicial to any. The only cases in which the surgeon is the least likely to regret having employed it are those in which peritonitis simulates obstruction.

Some interesting statistics concerning *intussusception* are given by Jenkins,²²⁴; 70 or 80 per cent. of the cases occur in children younger than 12 years, and of these 62 per cent. have not passed the first year. The frequency of the location is given as follows: ileum into ileum, 15 per cent.; ileum into cæcum, 60 per cent.; colon into colon, 15 per cent.; colon into ileum, 10 per cent. Three cases of intussusception are reported by him, located in the colon, in which injections of Vichy water from a siphon were used successfully in all 3 cases. White,⁶ showed to the Pathological Society of London a specimen of intussusception of the jejunum, which had commenced 2 feet and 6 inches below the pylorus. This case, rare from the fact that the intussusception was very high up, had occurred in an adult, and was due to a polypus. Rivington,⁶ reports 2 cases of intussusception of the gut into the rectum, in which a Barnes bag was introduced into the rectum and inflated, the result being successful in both cases.

A case is reported by Ayer,⁹⁹ of intussusception complicated by tuberculosis and pregnancy, in which the symptoms were so obscure that a positive diagnosis was not made until the passage of over 2 feet of the invaginated gut, twenty-two days after the patient was taken ill. The patient was delivered of a male child, six or seven months before term, fifty-three days after passing the coil of intestine, and died forty-seven days after the birth of the child.

In the treatment of intussusception, the contra-indications to injections of any nature whatever are: 1. When the intussusception lies in the ileum. 2. Extensive peritonitis. 3. Firm adhesion between opposed surfaces of the gut. 4. When collapse has taken place. The mortality of the different methods of treatment is: by inflation with gases, 15 per cent.; injections of fluids, 60 to 70 per cent.; laparotomy, 74 per cent.

Clause¹⁰¹ gives an account of 2 cases of intestinal occlusion cured by enemata of sulphuric ether. He dissolved 10 grammes (2½ drachms) of ether in alcohol, added to this 300 grammes (10 ounces) of fennel-water, and injected the fluid as high as possible into the intestines.

McDonald has arranged the following table to aid in the diagnosis of intestinal obstruction.¹⁰⁵

	STRANGULATION BY BANDS.	VOLVULUS.	INTUSSUSCEPTION.
AGE.	Young Males.	Males above 40.	Young Children.
PAIN.	At umbilicus, severe from beginning.	In hypogastrium or back. Comes on at once, but not so severe; intermits.	Prominent; comes in waves.
VOMITING.	Early, frequent, copious, stercoraceous on fourth or fifth day.	Late or not at all; never very urgent; 15 per cent. of cases feculent.	Very variable symptom.
CONSTIPATION.	Complete from first.	From first.	Blood from bowels, with tenesmus.
ABDOMINAL DISTENSION.	Not at first marked; no tumor.	Rapid accumulation of gas, causing great distension. No tumor.	Usually absent; tumor felt through parietes or in rectum.
DURATION.	Die about fifth day.	Average six days.	Twenty-four hours to several days.

Zoege-Manteuffel²¹ gives the differential signs of the two forms of ileus, as follows:—

I. STRANGULATED ILEUS.

Pathological Changes.

1. Localized meteorism. Flatulence of the strangulated loop.

Clinical Symptoms.

1. Asymmetry of the abdomen. Localized resistance.

2. Ischæmic paralysis of the strangulated loop of intestine.

2. Complete quiet under the abdominal wall; no peristalsis visible or sensible.

In this category are included knotty formations, volvulus incarceration, strangulations, and invaginations.

II. OBSTRUCTIVE ILEUS.

Pathological Changes.

1. Localized meteorism produced by dilatation above the obstruction.

2. (a) No great disturbance of circulation; (b) hypertrophy of the muscular tissue of the gut above the obstruction.

Clinical Symptoms.

1. Asymmetry and palpable resistance.

2. Peristalsis can be seen and felt.

To this group belong strictures, obstructions by foreign bodies, tumors, fæcal masses, and flexures.

Werner,⁴¹_{Nov. 11, '99} reports a case of intestinal obstruction, occurring in a woman 81 years of age, which began with colicky pains and the vomiting of fæcal matter; she had no passage from the bowels for nine days. The patient was given pellets of ice, the stomach being washed out with lukewarm water; finally, the vomiting ceased and defecation was established, though the stools were not examined for any cause of obstruction. This patient was still living five years later. A case of obstruction is reported by Simon,⁴¹_{Nov. 11, '99} in a girl 10 years old, in which there was vomiting for three weeks; later she expelled a sausage-shaped mass consisting of apple-parings. The author concludes that this mass must have obstructed the duodenum for weeks. Huff¹⁸⁵_{Oct} gave rectal injections of sulphuric ether and castor-oil, each $\frac{1}{2}$ ounce (15 grammes) in a quart (1 litre) of tepid water, in 2 cases of intestinal obstruction, with very gratifying results. Playfair⁸⁶_{Nov.} reports a case of stenosis of the intestines, due to the pressure and adhesion of a mass of enlarged tubercular glands.

EXPERIMENTAL CONTRIBUTIONS TO THE PATHOLOGY OF ILEUS.

Kirstein⁸⁹_{Nov. 99} calls attention to the fact that ligaturing the intestine in a dog does not provoke permanent occlusion, because, as the ligature cuts its way through, the divided ends of the intestine reunite, and the animal recovers perfectly. It is different when the intestine is divided and each end closed separately by sutures; in this way typical ileus may be produced. The author narrates an experiment on a dog in which this procedure was adopted. The striking feature was that, notwithstanding the completeness of the

occlusion, the animal lived for six weeks without stercoraceous vomiting and other characteristic signs of ileus. In the second week, however, the animal lost appetite and refused to eat, became more and more emaciated and feeble, and finally died of marasmus. At the autopsy the duodenum was found empty, and only the lower parts of the intestines were filled with fluid fæces, while at the seat of the occlusion the gut was markedly distended.

In the cases in which the intestine is ligatured, symptoms of ileus (stercoraceous vomiting, etc.) promptly supervene, and it seems strange that they did not occur when the gut was occluded by sutures, as above described. The explanation is probably as follows: Feculent vomiting may occur as a consequence of the interrupted continuity of the intestine, especially if the obstruction is high up; but, in general, the symptoms of ileus are more dependent on the injury inflicted on the gut at the seat of strangulation than upon the mere occlusion. The irritation of the intestinal nerves at the place of occlusion most probably provokes morbid reflexes in the upper parts and disturbs the normal peristalsis.

Juergens⁴_{Sept. 1} reports a case of progressive atony of the intestines, which was mistaken for ileus; as with the other symptoms, a tumor was found in the abdomen. At the autopsy the intestines presented a dark, brown-red appearance, especially of the duodenum; the cells of the muscular tissue, as well as those of the nerveplexus, were degenerated, and the nerve-endings especially showed a fibrous degeneration; from this condition the gut became diverticulated, scybalæ collected, and thus the symptoms of ileus were presented.

CARCINOMA AND TUMORS OF THE INTESTINES.

The following cases have been reported during the year: Carcinoma of duodenum, Sherman¹⁴⁷_{July}; carcinoma of the jejunum, with discussion of differential diagnosis, Riegel⁹⁰_{Nov.}; primary carcinoma of the ileum, with microscopical examination, Ransom⁶_{Nov. 16}; colloid cancer of the intestine and of the spleen, Lefebvre⁷_{Mar. 7}; cancer of cæcum, with perforation, Lyth²_{Nov. 31, '90}; primary cancer of the cæcum, Tison⁷_{Nov. 29, '90}; cancer of the colon, 2 cases.⁷_{Nov. 29, '90}

Link⁸⁴_{Mar. 27} reports a case of lipoma in the descending colon. This very rare condition is not only difficult or impossible of diagnosis, but it is also hard to determine its exact location. This

tumor, which had been felt on examination, was finally passed at stool. It was about the size of one's fist, and was attached to the gut by a pedicle; the pedicle was ligated and the tumor removed by a thermo-cautery, the patient making a perfect recovery.

Tito-Carbone⁴¹_{June 16} found an adenoma 5 millimetres in diameter, irregular in shape, situated in the lower part of the jejunum, between the muscular and mucous coat.

Grawitz⁴¹_{June 16} reports a case of a ring-like fatty degeneration of the gut, in which there were punctiform hæmorrhages, caused by the pressure from scybala. This condition occurred in a woman who had cancer of the breast, with metastatic deposits in the liver.

FOREIGN BODIES, INTESTINAL CONCRETIONS, ETC.

A report is given by Kennedy⁸⁶_{Feb.} of calcareous plates passed from the intestines. Berwick²_{June 14} gives an account of the swallowing of the handle of a toy organ by a child aged 8 months, and its expulsion from the bowel in three days. Rousson¹⁸⁸_{Feb. 3} describes intestinal concretions. Troup⁸⁶_{Feb.} saw an intestinal concretion formed of the fibro-vascular tissue of the pericarp of the oat and mineral matter. Leslie²_{Apr. 28} reports a case where an artificial tooth-plate was swallowed and passed per anum in four days. Craig²_{Dec. 21, '90} reports a case with severe hæmorrhage from the rectum and dangerous collapse, from the irritation of a jagged plum-stone. Ferguson⁸⁹_{Sept. 1} describes a case in which a cent coin was swallowed by a boy aged 7 years. Eight months afterward he had an attack of intestinal colic in the region of the ileo-cæcal valve. Two months later he passed the cent, imbedded in a hardened mass of fæces. Flint¹_{Mar. 5} gives an account of the swallowing of a piece of broken glass tube, $\frac{1}{8}$ inch long and $\frac{1}{8}$ inch in breadth, which was passed in seventy-two hours after the administration of two doses of castor-oil.

PERITONITIS.

Vierordt³²⁶_{v. 44} in summing up his conclusions in regard to chronic peritonitis, says that all cases of subacute and chronic peritonitis are commonly tubercular, though peritonitis of a non-tuberculous variety may exhibit symptoms such as hectic and wasting. Tubercular peritonitis may be cured by rest in bed, suitable diet, etc.; but, after a fair trial, if no improvement occurs, operation is imperative.

A case of peritonitis from the Military Hospital Reports of Brussels is recorded ⁴⁵⁴_{Apr. 1} where the peritoneal cavity was filled with gas, but upon the closest post-mortem examination no intestinal perforation was discovered, nor was any faecal matter found in the cavity. The only explanation of this abundance of gas was that it was due to the decomposition of material of which a great quantity was found in the cavity.

Archéalme and Courtois-Suffit ¹⁰⁰_{Nov. 3} contribute an excellent article on the "Rôle of Micro-Organisms in the Etiology and Evolution of Acute Peritonitis." From the experiments and results of various authors the following conclusions are deduced: 1. Acute peritonitis may be provoked by aseptic irritating substances, or especially by micro-organisms. These last alone give rise to true suppurative peritonitis. 2. The micro-organisms which provoke peritonitis are those found in pus, the staphylococcus and streptococcus; an accompanying or preceding change in the peritoneum is necessary before they can multiply. 3. If the absorptive functions of the peritoneum are profoundly altered, the microbes produce putrefaction of intra-peritoneal fluids, and, secondly, a general putrid infection of the economy.

The authors describe the symptoms of the different forms of peritonitis due to different micro-organisms; the origin, entrance, and routes of propagation of the infective agents.

In a series of experiments in regard to purulent peritonitis, Waterhouse ²⁸²_{Apr.} found that the injection of even large quantities of pyogenic bacteria into the peritoneal cavities of dogs and rabbits was not sufficient to cause suppuration unless they were mixed with some substance difficult of absorption, such as blood, etc., or unless the peritoneum was at the same time influenced by some substance, such as turpentine or croton-oil. A laparotomy wound was not in itself a predisposing cause of peritonitis, because laparotomy and injection of staphylococci gave negative results.

Tubercular Peritonitis.—Much progress has been made in recent years in regard to the treatment of tubercular peritonitis, and the advisability of surgical interference is no longer questioned. Koenig, in an exhaustive article presented to the Berlin Congress, gave a summary of 131 cases which had been subjected to surgical treatment; of these 24 died, 84 were cured, and in 23 the symptoms were ameliorated. One hundred and twenty of the

131 occurred in women. The experience from post-mortem examinations does not verify this proportion, as in 107 autopsies, in which there was tuberculous disease of the peritoneum, 89 occurred in men and only 18 in women; so the conclusion may be drawn that its occurrence in the sexes is about equal.

In regard to simple puncture and irrigation, or laparotomy, the consensus of opinion is in favor of laparotomy. Nor is it necessary to irrigate the peritoneal cavity with an antiseptic fluid, as equally good results are obtained from the use of sterilized or boiled water. In several cases reported the examination of the peritoneum after death, months after the operation, revealed no trace of tuberculous deposits. The theory that this is a local and primary affection is by no means demonstrated, and the concurrence of intestinal and pulmonary complications is one of common or universal occurrence. Nevertheless, the results obtained are surprising and marvelous, and place the surgical treatment of this affection in no uncertain position.

Bruhl¹⁰⁰_{Oct} contributes quite a full paper on this subject, giving the history of laparotomy for tubercular peritonitis. He also attempts to explain the process of cure after operation, and concludes that the peritoneum is an unfavorable tissue for tubercular development, and that the superficial situation of the tubercles permits the influencing of them by mechanical means. The explanation is not altogether satisfactory.

That tubercular peritonitis has a tendency to spontaneous cure is an opinion held by many observers, and this belief is rather confirmed by the history and subsequent examination.

Finlay²_{Nov. 1} reports a case where tuberculous peritonitis, complicated with double pleurisy, recovered. He considers that there are two varieties of the disease,—one dry and one with effusion,—and that the latter are the cases in which cure usually followed.

Debove³_{Oct} reports a successful case of tubercular peritonitis treated by abdominal irrigation with puncture, but without laparotomy.

CHYLOUS ASCITES.

The Cook County Hospital, of Chicago,²³¹_{July} reports a case of chylous ascites, and Martin²_{Oct} gives the details of a similar case with chylous hydrothorax. The latter condition is much less fre-

quent than the former, 10 only having been found by Busey to 53 of chylous ascites.

DISEASES OF THE MESENTERY.

A case of cyst of the omentum is reported by Ransom.²

Rasch²_{Nov.2} operated on a large cyst of the mesentery which contained chyle. He refers to a similar case operated on by Bergmann²²⁶₂₇ as the first recorded case.

Fetherston²⁸⁵_{June} describes the removal of a chyle-cyst of the mesentery, which contained $3\frac{1}{2}$ pints (1.75 litres) of chyle.

Carson⁶¹_{April} also removed a cyst of the mesentery as large as a foetal head; it contained 5 pints ($2\frac{1}{2}$ litres) of fluid which showed cells and minute fat-globules, resembling those of milk, and crystals of the sodium chlorides. The conclusion was that the sac was connected with the lacteals, or the cisterna mesenterica. The author has collected 11 cases, including his own; 7 were discovered and operated on; 4 were found in the post-mortem room. This last does not include the cases of Rasch and Fetherston mentioned above.

Brookhouse,²₁₈₈₈ reports the notes of a case of fibroid tumor of the mesentery which weighed $13\frac{1}{2}$ pounds when removed. The patient died soon after the operation.

Princeteau showed a myxosarcoma of the mesentery,¹⁸⁸_{Nov.17, '90} and Lamarque¹⁸⁸_{Nov.26, '90} presented to the same society, at Bordeaux, an enormous sarcoma of the mesentery. Iwasa²⁰⁰₁₈₉₉ read before the Japanese National Medical Congress the report of a case of sarcoma of the mesenteric glands.

Solman⁵²⁰_{Nov.1} reports a case of a chylous cyst occurring in a girl about 20 years of age; the tumor was felt in the neighborhood of the umbilicus; it was elastic and fluctuating, dull at the apex, but tympanitic at the periphery. After removal it was found to be a membranous sac, made up of connective tissue, containing a yellowish-white, thick, creamy liquid, which was composed of fat-drops, fat-crystals, fibroid flakes, and lymphoid cells.

Hadlich,⁴₁₈₉₉ reports a case of multiple necrosis of the adipose tissue of the mesentery and pancreas, accompanied with profuse hæmorrhages into the tissues of both organs.

The first case of this condition was reported by Baker,²⁰_{1890, '92} and very greatly resembles a condition reported by Gerhardt,²⁰₁₈₉₀ which was called by Klebs necrotic hæmorrhagic pancreatitis.

FREE BODIES IN THE PERITONEAL CAVITY.

In a patient treated at the Cook County Hospital, Chicago, ²³¹_{July} two loose bodies were discovered, composed of a capsule of fibrous tissue, with contained fat-cells and amorphous granular material. They were circular in shape, and were found in a depression on the convex surface of the right lobe of the liver. The writer alludes to other *corpora libera* found in the peritoneal cavity. Among these are subserous fibro-myomata of the uterus, ovaries; Morgagni's hydatids on the fimbria of the Fallopian tubes (any of which may be set free by twisting and rupture of the pedicles); biliary and intestinal calculi; the products of conception; bodies consisting of fibrinous exudate produced in some forms of peritonitis; *appendices epiploicæ*, small peritoneal pouches filled with fat, situated along the colon and upper part of colon. The two bodies found and described in this paper were undoubtedly of this nature. Authors are referred to who have observed these bodies.

CHOLERA ASIATICA—CHOLERA MORBUS.

Etiology.—Scholl ¹¹³_{Oct. 2} quotes Griesinger as having shown that the specific cholera poison was the result of certain conditions of putrescence of organic matter, which have no connection with ordinary putrescence. The effect of this poison is shown in the destruction of the epithelium and the upper layer of the mucous membrane of the gut; by its absorption it exerts its action on the entire organism, especially the circulatory organs. The complex symptoms of cholera are not from a loss of water and consequent thickening of the blood, but from toxæmia.

Hueppe, ⁴₁ says that the infection of cholera is not by swallowing of the bacillus in food only, but that it may be inhaled, coughed up, and afterward swallowed, as the bacillus may live a long time in the dry condition; a patient cannot, however, become infected through the lungs, thus proving that the infective agent is not a blood parasite. The alkaline juice of the intestine is necessary to develop it, and the entire process of cholera is in the gut. The bacillus cannot only live when shut off from the air and oxygen, but it grows more where this condition exists, though it cannot then so strongly resist the action of remedial agents, and especially cannot withstand the action of acids. The cholera bacillus is more easily destroyed in the fresh stools than in any other con-

dition; for this reason it is especially important to disinfect the stools immediately. The germ, when first passed, is so weak that it cannot resist the action of the gastric juice, if the stomach is in a healthy condition; on this account it is not directly transmissible from the patient to the nurse; but, in a short time after exposure to the air, the bacillus gains greater resistance to all germicide agents. The author concludes that Asiatic cholera is certainly a miasmatic, contagious disease, its epidemic character depending upon outside conditions.

Pathology.—Kobler⁸⁴_{July 10} cites 2 cases of cholera morbus in which the usual symptoms of true cholera were very pronounced, thereby disproving the theory that the kidneys are affected only in Asiatic cholera and not in cholera morbus. The cases reported present all the symptoms of Asiatic cholera, though the absence of an epidemic in the vicinity nullified such a diagnosis. A peculiar feature of both cases was the presence of only $\frac{3}{10}$ per cent. of albumen in the urine in one case and $\frac{4}{10}$ per cent. in the other, though in both cases there was an immense quantity of hyaline casts, which entirely disappeared in a very short time. He urges that the anæmia in these cases must not be attributed to blocking up of the uriniferous tubules with casts, as is held by some, for as soon as the heart action increased these casts were readily passed.

Treatment.—Hueppe⁴_{July} advises the use of atropine when the signs of intoxication from the poison are severe, and he has found that salol lessens the anæmia. The thickening of the blood is from loss of water, which may be replaced as long as the skin functions are good by packing or by a direct replacement of water by injections of a 5-per-cent. solution of the chloride of sodium; the gut having been previously washed out by hot tannic-acid injections (Cantani) or injections of the acetate of lead. As a beverage, he advises the alkaline waters and, at the same time, stimulants. The injections should be received, when expelled, into a 3-per-cent. solution of carbolic acid, to which a little crude muriatic acid has been added. During an epidemic no change in the food of the healthy should be made, but great care should be exercised in preserving the food and in protecting it from flies.

Groneman⁴¹_{Aug. 25} believes that he has discovered a cure for cholera in creolin. He gives 5 grammes ($1\frac{1}{2}$ drachms) in 200 grammes (7 ounces) of water, and repeats the dose without danger. Hackin²⁰²_{Nov. 25}

says the word cholera, as we understand it, is a generic term serving to designate different affections, viz., cholerine, cholera infantum, summer diarrhoea, sporadic cholera morbus, and Asiatic or epidemic cholera. These affections, he says, are generally regarded as distinct, but he thinks they are of one character, and, though presenting degrees, bear the same chological relations; they are denominated by a common pathological principle, and consequently may be subjected to identical treatment. He considers the affection as provoked by a lesion of the sympathetic system of the abdomen, and believes that a checking of the action of the sympathetic nerves may be accomplished by the antagonism of the pneumogastric nerves. With this in view, there was instituted the treatment by blistering over the course of the pneumogastric back of the ear, preferably the right ear, as Coleman demonstrated that the right pneumogastric controls the small intestine; the effect is instantaneous, all the morbid phenomena disappearing before vesication has taken place.

Ritter von Giacich⁸⁴ reports the treatment of the algid state of cholera by the administration of gum ammoniac internally, together with stimulants and the injection of sulphuric ether hypodermatically; under this treatment great improvement took place in a couple of hours.

DISEASES OF THE DIGESTIVE ORGANS IN CHILDREN.

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DENTITION.

Forchheimer⁵¹ discusses, in an exhaustive manner, the symptoms and treatment of dentition. Other papers by him upon this subject were reported in the last issue of the ANNUAL. He believes dentition to be a physiological process subject, perhaps, to occasional pathological conditions, but these are infrequent and obscure. His conclusions regarding gum-lancing are as follow: 1. It is useless (*a*) as far as giving relief to symptoms; (*b*) as far as facilitating or hastening teething. 2. It is useful only in blood-letting, and ought not to be used as such. 3. It is harmful (*a*) in producing local trouble; (*b*) in producing general disturbance, on account of hæmorrhage; (*c*) in having established a method which is too general to do specific good, and too specific for universal use. 4. It is to be used only as a surgical procedure to give relief to surgical accidents.

DIGESTION.

Capacity of the Stomach in Infancy.—The senior editor measured personally the capacity of the stomach in 142 infants by the following method, which, after various trials, was the only one that seemed to be at all satisfactory or reliable:—

The pyloric orifice was closed by a ligature, and water allowed to flow into the stomach from a faucet under slight pressure, the cardiac orifice being tightly pinched about this nozzle. The stomach was allowed to fill slowly, and distend up to the point of obliterating the rugæ of the fundus and body of the organ. The walls are so thin in infancy that it was not found difficult to determine when this degree was reached by looking through the stomach at a strong light. In cases where the stomach was found at the autopsy

(E-1)

to be much relaxed, the organ was allowed to remain a day or two in a 50-per-cent. solution of alcohol, so that it could be much more easily manipulated and the unnatural distension from the weight of water prevented. Ninety-five of these cases were under 14 months of age, and of these 4 presented such a degree of dilatation that it might be considered fairly to be pathological. The following table shows the capacity in the other 91 cases:—

TABLE SHOWING AVERAGE CAPACITY OF THE STOMACH IN NINETY-ONE CASES.

AGE.	NO. OF CASES.	AVERAGE CAPACITY.	
Birth,	5	1.20 ounces (37.3 grammes).	
Half-month,	7	1.50 ounces (46.6 grammes).	
One month,	4	2.00 ounces (62.2 grammes).	
One and a half months,	11	2.27 ounces (70.6 grammes).	
Two months,	4	3.87 ounces (104.8 grammes).	
Two and a half months,	2	4.25 ounces (132.2 grammes).	
Three months,	6	4.50 ounces (139.9 grammes).	
Three and a half months,	3	5.00 ounces (155.5 grammes)	} — 5.00 average (ounces).
Four months,	4	5.62 ounces (174.8 grammes)	
Four and a half months,	5	4.50 ounces (139.9 grammes)	} — 5.75 average.
Five months,	4	5.62 ounces (174.8 grammes)	
Five and a half months,	2	5.25 ounces (163.2 grammes)	} — 6.88 average.
Six months,	8	5.94 ounces (184.7 grammes)	
Seven months,	6	7.00 ounces (217.7 grammes)	} — 8.14 average.
Eight months,	3	6.66 ounces (207.1 grammes)	
Nine months,			
Ten months,	5	8.40 ounces (261.2 grammes)	} — 8.9 average.
Eleven months,	2	7.50 ounces (238.2 grammes)	
Twelve months,	1	9.00 ounces (279.9 grammes)	} — 8.9 average.
Thirteen months,	4	8.75 ounces (256.6 grammes)	
Fourteen months,	5	9.00 ounces (279.9 grammes)	

From these we may deduce the following:—

1. Starting at birth with a capacity of about 1 ounce (31 grammes), the stomach increases in size at the rate of 1 ounce (31 grammes) a month during the first 3 months, reaching at this time about one-half the capacity seen at 1 year.

2. From 3 to 8 months its growth is much slower, being, on the average, about $\frac{1}{2}$ ounce (15 grammes) a month.

3. From 8 to 14 months the rate of growth is still less, being, on the average, about $\frac{1}{3}$ ounce (10 grammes) a month.

Approximately, at birth, 3, 6, and 14 months, the capacity is, respectively, 1, $4\frac{1}{2}$, 6, and 9 ounces (31, 140, 187, 280 grammes).

It is to be expected that in unusually large children the stomach will be a little above the average, and in very small children somewhat below this point. It was a frequent source of surprise that these variations were so slight. The weight of the child was ob-

tained in 75 of the cases. There was no relation whatever between the weight of the baby and the capacity of the stomach.

Physiology of Infantile Digestion.—E. P. Davis,⁹ from a long series of investigations, concludes that the stomach of the healthy infant contains neither lactic nor hydrochloric acid. When gastric catarrh or fever is present an acid appears, but it is neither of the two acids mentioned. The milk-clot from healthy infants, whether nursed at the breast or fed upon sterilized milk, contains no bacteria; the fat-globules are reduced to granular matter in from half an hour to one hour after feeding. In proportion as gastro-intestinal disease exists, the excreta contain an excess of undigested fat. It is to be concluded, therefore, that lactic and hydrochloric acids do not normally exist in the stomach of the young infant; that milk is clotted by a rennet ferment active in alkaline or neutral media; that the stomach is empty within an hour after feeding.

Booker,⁷⁶⁴ with other investigators, finds that milk remains in the stomach of infants for a shorter period than in adults. The time depends upon the age of the infant and the character of the milk. In breast-fed infants during the first week the stomach is sometimes emptied in an hour. One and a half hours may be considered the maximum time for breast-fed children during the first month, and two hours for older children and those fed on cows' milk. Whether it passes from the stomach continuously or periodically has not been determined. The reaction of the contents of the stomach during the first few minutes after feeding is that of the food taken. After fifteen minutes it is always acid. Milk absorbs hydrochloric acid very rapidly, so that free acid does not appear until late.

In disordered conditions of digestion milk remains much longer than in health. Milk-curds may be washed out four or five hours after feeding. Hypersecretion of mucus usually accompanies retarded digestion.

Study of bacteria from the stomach shows the number to be very small as compared with the enormous number appearing in the feces. No constant bacterial growth was found. Forms resembling bacterium lactis aërogenes, bacterium coli commune, sarcina, and large fungi frequently appeared.

Stomach Digestion in Infantile Atrophy.—Cassel¹⁵⁸ made

twenty-seven experiments upon 7 children from 1 to 8 months old. The diet in no case was breast-milk, but either cows' milk, diluted with water or with oatmeal gruel, or Nestle's food, with or without milk. Examination of the gastric contents was made upon portions withdrawn by catheter, and the following tests were made: (1) reaction; (2) as to the presence of free acid, hydrochloric, (3) lactic, (4) butyric; (5) the albumen-digesting ferment; (6) the test for digested starch.

His observations made upon the digestion of healthy infants confirmed those of Leo, *i.e.*, that the stomach is empty two hours after a meal, excepting usually a few drops of mucus or yellowish fluid; sometimes an opaque fluid, with gray flakes, 1 or 2 drachms in quantity, in which free hydrochloric acid was always found. The stomach in cases of infantile atrophy was found to contain food after four hours, and in very many cases after six hours. This, the author thinks, is largely due to disturbance of the motor activity of the stomach. In 3 of the cases free hydrochloric acid could not be demonstrated by any test. One was a case of tuberculosis; the others were lost sight of. In 1 case, after six tests, hydrochloric acid was only found once; in 1 case it was found at a single test; so that upon this point the author's observations confirm those of Moncorvo, referred to in last year's ANNUAL, in regard to the frequent absence of hydrochloric acid from the gastric juice in similar cases.

The presence of lactic acid could seldom be demonstrated. Butyric acid was frequently found. The albumen-digesting ferment was present in all cases; the rennet ferment was always present, also frequently zymogen, even though boiled milk had been given. The transformation of starch into dextrin was noted in 1 case in an infant 2½ months old, an almost complete result being given by erythrodextrin test. In 2 other cases the achrodextrin reaction was present; mucus in 3 cases was very abundant. Gases almost always escaped upon the introduction of the catheter.

The conclusions reached are that the gastric functions in cases of atrophy are characterized (1) by diminution of hydrochloric-acid secretion; (2) weakening of the albumen-digesting power; (3) presence of lactic acid; (4) presence of butyric acid; (5) the longer retention of food in the stomach; (6) in some cases the production of a large amount of mucus.

In extreme atrophy there is absence of hydrochloric acid, and also of the pepsin and rennet ferments. This degree, no one of the cases experimented upon had reached. Microscopical examination was made of the stomach in the single fatal case, and no lesions found, excepting a very moderate cell-infiltration, confirming the observations of Baginsky and others that atrophy of the gastric tubules is rarely present.

The Relative Digestibility of Plain and Sterilized Milk.—Chapin,⁵⁹ reports a large number of experiments regarding the action of different reagents upon plain cows' milk and sterilized milk. Lactic acid, artificial gastric juice, bichloride of mercury, and the mineral acids were the reagents employed. They were found to produce larger and more confluent curds in plain milk than in sterilized milk. The addition of heat in the former case broke up partially the large curds, but the small curds of the sterilized milk were not affected by warming. The heat employed in sterilizing seemed to produce all the change possible by that agent. A single exception occurred where a solution of bichloride of mercury was employed in a strength of more than 1 to 160. The sterilized milk was then transformed into a jelly-like coagulum. This led to further experiments with several antiseptics sometimes employed in diarrhœa,—naphthalin ($2\frac{1}{2}$ per cent.), salicylate of soda (5 per cent.), creasote (5 per cent.), boric acid (1 to 8), and salol; they produced no change in either plain or sterilized milk, cold or warm. In experiments upon human milk it was found that the heat employed in sterilizing caused the caseine to coagulate in slightly smaller clots. Experiments were still further tried upon dogs with gastric fistulæ by feeding them with plain milk and sterilized milk and withdrawing the contents of the stomach after an interval of ten minutes. The result of these trials was negative. While sterilization is a great step in advance, it does not solve the whole problem of infant-feeding, as so many seem to think, for we still have to deal with indigestible caseine.

Stomach - Washing.—Booker⁷⁰⁴ has had a large experience in stomach-washing. His apparatus is the one proposed by Epstein. A soft Nélaton's catheter, No. 8, 9, or 10, is attached by a short glass tube to a common rubber tube, 2 feet long, with a 2-ounce (62 grammes) glass funnel fitted into the distal end; a pitcher containing $\frac{1}{2}$ gallon (2 litres) of tepid water is placed in a conve-

nient position. Sometimes it is of advantage to add a teaspoonful of equal parts of bicarbonate or benzoate of soda. The child is held in a sitting position in the nurse's lap, with the head slightly bent forward and the hands confined by the left arm of the nurse across the chest; the front of the child, as well as the nurse's lap, should be protected by a rubber sheet; the tube is moistened with water, inserted into the mouth, passed back to the pharynx, and directed downward into the œsophagus and stomach without interruption; gagging, or even vomiting, may occur, especially if the tube is delayed in the pharynx; it usually ceases when the tube reaches the stomach; if it does not, the tube should be drawn up a little and carried to one corner of the mouth; it is not necessary to depress the tongue with the finger; from 1 to 2 ounces (31 to 62 grammes) of water are poured into the funnel, held just above the level of the child's head; by lowering the funnel to the basin on the floor, the contents of the stomach readily flows out by siphon action. The process should be repeated until the water flows away clear. There is no danger of the tube entering the larynx, nor of perforating the stomach.

The stomach-tube is employed for three purposes: 1. Study of physiological digestion. 2. Study of changes in disordered digestion. 3. As a therapeutic measure.

As a therapeutic measure, those who have used it most are most impressed with its value. The author has employed it in 200 cases. It has proved the quickest and most effective means, of relieving vomiting, of any measure he has used. In most cases it is promptly relieved after the first washing. Vomiting occurring with dysentery was less affected than in other conditions. In summer diarrhœa, even when there is no vomiting, milk-curds collect in the stomach, so that that organ is never found empty.

Removal of these curds not only prevents their passing into the intestine as a source of irritation and fermentation, but relieves the restlessness and depression so often dependent upon their presence in the stomach. In some cases of diarrhœa stomach-washing afforded complete relief without other treatment. In other cases the results were disappointing. Improvement sometimes followed the first washing, after which no good results appeared.

Constipation dependent upon a catarrhal condition of the gastro-intestinal tract may sometimes be entirely relieved by stomach-washing.

Stomach-washing is contra-indicated in children affected with heart disease, serious bronchitis, or pulmonary trouble. If the tube continues to excite vomiting and strong resistance it is doubtful if advantage follows its use.

Seibert⁵¹ reports 1404 cases of gastro-intestinal catarrh treated by him in private and dispensary practice. Stomach-washing was employed in 521 cases. In no case was the child worse after the procedure; nor was it immediately followed by depression, convulsions, or death. All cases of diarrhoea, whether mild or severe, were treated by bowel-washing, performed from one to three times daily. The results were most gratifying. Plain warm water was employed, a fountain-syringe being used.

The author is enthusiastic concerning the results obtained, both by stomach- and bowel- washing.

Troitzky⁵⁸⁶ has treated 64 cases of vomiting under different conditions by stomach-washing, and has arrived at the following conclusions:—

1. It is a very valuable means of cutting short incipient gastro-intestinal disturbances.
2. The earlier it is resorted to, the better the effects.
3. The best results are obtained in non-febrile dyspepsia. Of these a purely gastric form yields most quickly.
4. In specific summer diarrhoea it must usually be supplemented by other therapeutic measures.

DIARRHOEAL DISEASES.

Classification and Nomenclature.—The scheme of classification which the senior editor here offers¹ is made up from a study of the clinical and pathological features of 70 cases examined microscopically, about 200 autopsies in which microscopical examinations were not made, and upward of 1500 non-fatal cases.

A classification based upon pathological findings solely is complicated and confusing to the clinical worker. In the left-hand column will be found the best grouping of the cases clinically which it seemed possible to make, and in the right column the pathological conditions to which these clinical varieties usually correspond:—

*Clinical.**Pathological.*

- | | |
|----------------------------------|---|
| I. Simple diarrhœa | No lesions. |
| II. Acute mycotic diarrhœa . . . | Acute desquamative catarrh. |
| 1. Acute dyspeptic diarrhœa. | |
| 2. Cholera infantum | |
| III. Acute enterocolitis | <div style="display: inline-block; vertical-align: middle;"> <div style="font-size: 3em; vertical-align: middle; line-height: 1;">{</div> <div style="display: inline-block; vertical-align: middle;"> 1. Catarrhal.
 2. Croupous.
 3. Follicular ulceration (ulceration of lymph-nodules). </div> </div> |
| IV. Chronic dyspeptic diarrhœa | <div style="display: inline-block; vertical-align: middle;"> <div style="font-size: 3em; vertical-align: middle; line-height: 1;">{</div> <div style="display: inline-block; vertical-align: middle;"> Hyperplasia of lymph-nodules, or no lesions. </div> </div> |
| V. Chronic enterocolitis . . . | <div style="display: inline-block; vertical-align: middle;"> <div style="font-size: 3em; vertical-align: middle; line-height: 1;">{</div> <div style="display: inline-block; vertical-align: middle;"> 1. Chronic catarrhal inflammation.
 2. Follicular ulceration. </div> </div> |

I. Under *simple diarrhœa* are included cases without fever or vomiting; these being usually functional and chiefly due to exaggerated peristalsis, the opportunities for examination of pathological specimens being those in which the diarrhœa occurred as a complication of other diseases.

II. *Acute mycotic diarrhœa*, including those of bacterial origin, these being subdivided into—

(1) *Acute dyspeptic diarrhœa*, characterized by usually an abrupt invasion, vomiting, considerable fever; the acute symptoms usually being of short duration, and a large number of the cases going on to recovery.

(2) *Cholera Infantum*.—This term is limited to the cases characterized by profuse vomiting and purging, serous stools, great prostration, highly developed nervous symptoms, and hyperpyrexia; these cases including only about 1 or 2 per cent. of those seen in summer.

Of the 70 cases studied under the microscope, 22 were classed as acute mycotic diarrhœa, 4 of these as true cholera infantum and 18 as acute dyspeptic diarrhœa without choleraic symptoms; 13 of these 18 cases suffered previously from athrepsia. The only constant and essential change in this class of cases was desquamation of the superficial epithelium. Bacteria were found upon the surface of the mucous membrane in all cases, but very rarely in the deeper tissues, unless the autopsies were more than six hours after death. At this time this appearance can be hardly considered as having significance. The term "acute desquamative catarrh" is suggested, since these cases are pretty sharply differentiated from the others in which the exudative lesions were present.

III. *Acute Enterocolitis*.—Under this head are grouped all the acute cases in which there was not only loss of epithelium, but also an inflammatory exudation of cells, or cells and fibrin. These cases are quite distinct clinically from the foregoing. They are characterized by a much longer course and a continuance of severe symptoms, especially fever. The nature of the lesions met with in acute enterocolitis and their relative frequency were as follow: Acute catarrhal inflammation, 16 cases; acute croupous inflammation, 9 cases; follicular ulceration, or ulceration of the lymph-nodes, 20 cases.

(1) *Acute Catarrhal Inflammation*.—This was seen in a superficial form affecting the mucosa only, with moderate cell-infiltration; also in a severe form with more dense infiltration, small hæmorrhages, and wide-spread destruction of the tubular glands, the infiltration extending in many cases to the submucosa, and even to the muscular coat. The superficial form is most likely that variety which exists in most cases which recover; the severe form is probably generally fatal. This process is localized with great uniformity in the last 2 or 3 feet of the ileum and the whole of the colon.

(2) *Acute Croupous Inflammation*.—Localization is the same as in the preceding. In addition to the lesions found in the severe catarrhal variety, there were seen in these cases pseudo-membrane upon the surface, an infiltration of the entire mucous, submucous, and even the muscular layer. The peritoneal coat was rarely involved. There was no deep sloughing seen in any case, and no large ulcers. So intense a lesion must be almost uniformly fatal.

(3) *Follicular Ulceration*.—The lymph-nodes or solitary follicles are commonly found swollen in the cases of acute catarrhal inflammation. In a considerable number of the cases the breaking down of these nodules and the formation of ulcers were the chief lesions. Follicular ulcers never existed without other evidences of inflammation, usually catarrhal. Clinically, these cases run a slower course than the other varieties, with a strong tendency to become chronic and with lower temperature. They were found in rather more than half of the cases lasting over two weeks. Situation of the ulcers: in the small intestine only, in 2 cases; in the small intestine and colon, 3 cases; in 15 cases in the colon only. When in the colon, the ulcers were most numerous and deepest in

the lower half of the gut. In 14 of the cases blood was present at no time in the stools. Traces of blood were seen in 4 cases, and in 2 blood was abundant. It is evident that this symptom of ulceration, upon which so much stress has often been laid, is of little or no value. The small ulcers involved the mucous coat only; the deeper ones extended to the muscular layer; perforation was seen in no case. By far the greatest number of cases in which ulcers formed proved fatal within four or five weeks; occasionally one drags on for two or three months.

It does not seem to be yet possible to separate clinically these three varieties of enterocolitis,—the acute croupous, acute catarrhal, and the cases of follicular ulceration. The types are fairly distinct from each other, but the cases shade into one another by insensible gradations. The term dysentery I have omitted from the classification as being one of very doubtful signification, and rather confusing than otherwise.

The most important classification for the purposes of treatment is into cases in which we have to do with an acute process of decomposition in the intestines with functional derangement and no lesions but desquamation of the epithelium, and the cases in which severe organic lesions are present. The most important differential point between these two great classes is the existence of fever. Continuous fever beyond the second or third day points very strongly to the existence of inflammatory lesions. Transient rises of temperature are to be looked upon as of toxic origin. Of the secondary lesions, seen in cases dying of acute diarrhoeal disease, of the 70 autopsies in but one were any marked changes seen in the brain, this being one of extreme cerebral anæmia. Broncho-pneumonia was the most frequent pulmonary lesion, it being found in one half of the cases that had lasted more than ten days.

IV. *Chronic Diarrhoea.*—Chronic diarrhoea may last for months, and, the intestines being examined microscopically within a few hours after death, absolutely nothing pathological may be seen. These cases have been termed “chronic dyspeptic diarrhoea.” In another class of cases where the clinical symptoms are quite similar, we find hyperplasia of the lymph-nodules or solitary follicles of the intestines, these being usually seen only in the colon. Chronic enterocolitis follows the acute form, usually follicular ulceration.

Etiology.—Meimert,⁵⁷ states that in Dresden the greatest mortality is in the first six months of life. This is attributed to the habit of mothers in the lower classes of overloading their young children with clothing, they being dressed in bambino fashion.

Human milk protects against these diseases by the fact that it is more dilute during the warm months, in the writer's opinion, this depending upon the greater quantity of fluid drunk by nursing mothers. In the absence of any milk analyses this statement cannot have much weight. In infants fed upon cows' milk, however, too much food is almost invariably taken, because of the thirst which the infant has and the fact that there is no other means of relieving it save by overeating. The main point in prevention, in bottle-fed children, is to dilute the milk during the warm months.

The age at which diarrhoeal diseases are most prevalent has been investigated by Crandall.⁵¹ In 3000 cases occurring in New York City the ages are shown in the following table:—

First six months,	413 cases, 18.7 per cent.
Second six months,	878 " 29.1 "
Third six months,	723 " 24.1 "
Fourth six months,	514 " 17.2 "
Over two years,	478 " 15.9 "
Under two years,	2522 " 84.1 "
Between six and eighteen months,	1595 " 53.2 "

Susceptibility to the disease seems, therefore, to be almost limited to the first two years of life.

Bacteriology.—Our Berlin corresponding editor, Baginsky, reports having isolated fifteen varieties of bacteria from the stools of children suffering from summer diarrhoea, in addition to the *B. coli* commune and *B. lactis aërogenes* of Escherich, and the forms are not yet exhausted. The morphological and biological characters of the isolated varieties are fully described. The great majority of the bacteria belonged to the group classed as saprophytic. No constant form was found, and no one form predominated in a large proportion of the cases.

Baginsky concludes that in cholera infantum we have to do with a disease caused by putrefactive bacteria. It was not possible to follow out systematically all the products of decomposition produced by all the varieties. Some were selected having the most strongly marked proteolytic qualities, on the

supposition that these would produce the most toxic substances: (1) a green, fluorescent, liquefying bacillus; (2) a round, slowly-liquefying coccus. Sterilized beef-tea was inoculated. In a short time ammonia could be detected, the amount increasing very greatly as the decomposition went on. Conformably with this, the toxic action of the solutions made from the decomposing beef-tea resembled those of ammonia and its salts. Examination of the fæces freshly taken from patients with summer diarrhoea showed the presence of ammonia, besides other products of albuminous decomposition, *i.e.*, indol, and sometimes phenol and cresol. There was wanting, however, sufficient evidence to establish to what degree ammonia was produced in the intestinal canal, and also as to what part of the symptoms were due to ammonia products. Besides ammonia, another base was isolated from the fæces of cholera-infantum cases, which produced in frogs, in minute doses, stupor and death. More striking results were obtained when beef-tea was inoculated directly from the fæces, instead of pure cultures of bacillus above referred to.

A third bacillus, a white, liquefying one, was also studied. It produced, besides ammonia, a very poisonous ptomaine, with the formula $C_7H_{17}NO_2$, which is probably identical with the compound extracted by Brieger from putrefying horse-flesh. As the most important product of this germ, a toxic peptone was found. A similar body was obtained from milk which had been inoculated with the same germ. It appeared then that the saprogenic bacteria form poisons from albuminous substances present in the food, resembling peptone, and that in the further progress of decomposition, besides poisonous bases (ptomaines), were also produced other products of putrefaction,—indol, phenol, etc.; the process continuing, it finally ended in the production of a large amount of ammonia. Apropos of the large variety of bacteria, which seemed to be exciting causes in this disease, Baginsky calls attention to the very wide differences in the clinical symptoms manifested by the different cases.

Booker⁵¹_{Nov.} believes that with our present knowledge it would be unsafe to make positive statements regarding bacteria thus far isolated from diarrhoeal fæces. It is certain that different forms of injurious chemical action may be produced by different varieties of bacteria, and it is equally certain that the disease is not due to

any single germ. In children having diarrhoea without toxic symptoms, those bacteria have been found which, as far as their chemical action has been studied, cause acid fermentation of milk.

In children having diarrhoea with toxic symptoms other varieties of bacteria appear, and often in great quantity, among which are bacteria which cause putrefaction in albuminous compounds. No positive statement can be made concerning the antiseptic properties of the various digestive fluids. It is probable that the acid of the gastric juice is the only secretion of the digestive canal possessing antiseptic properties. In infants there are numerous causes which may materially diminish its antiseptic power. It is doubtful if the infant's stomach protects the intestine from injurious organisms.

The stomach contents, obtained by expression, were examined by the author in the cases of twenty children. Three were over 2 years of age and were fed on a mixed diet. In these, free hydrochloric acid was found. Cultures made from the stomach contents produced few, if any, colonies of bacteria. Fungi, especially *oidium lactis*, were quite abundant. Free hydrochloric acid was not found in the stomach contents of the remaining children who were fed exclusively on milk. In cultures from these cases colonies of bacteria were more numerous, but even here the paucity of colonies was in striking contrast to the enormous quantity in cultures from the *fæces*.

One of the most important papers of the year upon the chemistry and bacteriology of summer diarrhoea was that of Victor C. Vaughan.⁵¹ Taking the cultures of three germs from a series of fifteen isolated from diarrhoea patients by Booker, of Baltimore, he submitted them to most careful chemical manipulation. From each he obtained a highly poisonous proteid. Injected under the skin of kittens or dogs, it caused vomiting and purging, and, when employed in sufficient quantities, collapse and death. Post-mortem examination showed the intestines pale throughout and the heart in diastole. Conclusions derived from these experiments were as follow: 1. There are many germs, any one of which, when introduced into the intestines of the infant under certain favorable circumstances, may produce diarrhoea. 2. Many of these germs are probably saprophytic. A germ growing in the intestines does not necessarily feed upon living matter. If it will

grow in a certain medium in a flask and produce a poison, it will also grow in the intestines and produce the same poison, provided it is not destroyed by some secretion of the body. 3. The only digestive secretion which is known to have any decided germicidal effect is the gastric juice; therefore, if the secretion be impaired, there is, at least, the possibility that the living germ will pass on to the intestines, will then multiply, and will, if it be capable of doing so, elaborate a poison which may be observed. The chief reason why a breast-fed child does better than one fed upon cows' milk is because its food is free from germs; but a second reason is found in the larger amount of acid required to neutralize cows' milk. 4. Any germ which is capable of growing and producing an observable poison in the intestines is a pathogenic germ. It is not necessary that it should be capable of growing and causing death or disease when injected under the skin to establish its rank with the pathogenic germs. 5. The proper classification of germs in regard to their relation to disease cannot be made from their morphology alone, but must depend largely upon the products of their growth. Thus the three bacilli, while not closely related morphologically, were physiologically near akin.

Lesage³, has found in cholera infantum a bacillus which he colored after the method of Gram. Cultivated in gelatin or bouillon, an alkaline product is obtained, having a distinctive odor, which it retains many months. It is more resistant to external agents than the comma bacillus, and more tenacious of life. Isolated, it is capable of producing experimental cholera, like several other microbes. It probably plays, he thinks, an important part in the production of cholera infantum, as proved by the following reasons: 1. It exists only in cases of cholera infantum, frequently in large numbers. 2. It produces experimental cholera. 3. It produces a substance apparently identical with that produced by the comma bacillus. In doses of 4 to 5 milligrammes ($\frac{3}{16}$ to $\frac{7}{16}$ grain) it is toxic, and causes the death of the animal. 4. It produces choleraic intestinal lesions.

Pathogenesis.—Escherich¹¹³_{Oct. 12, 20, '99} states that the bacterial origin of summer diarrhoea cannot now be controverted, although there is yet wanting evidence to establish contagion, or the presence of specific organisms, or a typical clinical course.

We are not to look upon summer diarrhoea as a single in-

fectious disease, like typhoid fever or Asiatic cholera; the clinical symptoms indicate that these diseases depend upon widely prevalent germs, which only under certain conditions multiply and develop in the intestines. As a primary exciting cause, he believes the presence and multiplication of germs to be necessary, but that it is not necessary that these germs should be established to be pathogenic in animals. The products produced by given bacteria vary according to the temperature at which they grow; so that the same germs at a low temperature may cause only products which are irritating, and, at a higher temperature, poisonous ptomaines, capable of producing toxic symptoms. He quotes Hammerstein, who has shown that in the fermentation of milk from kefir grains, at a low temperature only CO_2 and lactic acid are formed, while at a higher temperature other organic acids, alcohol, and even toxic products may be present.

The susceptibility of the infantile organism is an important factor to be considered.

The author's experiments, with those of Cnopf, go to show that, as ordinarily handled in summer, cows' milk may contain one million bacteria to the cubic centimetre. He believes these germs to be the source of the disease in the greatest number of cases, although it is by no means true that, if sterile breast-milk or sterilized cows' milk be introduced into the body, it is free from germs when it reaches the stomach and intestines, as it has ample opportunity for contamination both in the mouth and in the œsophagus.

The acidity of the stomach, he believes, is no protection against the development of germs. He has never found in infants fed upon cows' milk free hydrochloric acid at any stage of digestion. Cows' milk seems to have great powers of absorption of hydrochloric acid. Thus, when to 50 cubic centimetres ($1\frac{1}{10}$ ounces) of breast-milk was added 8 or 9 cubic centimetres ($2\frac{1}{4}$ or $2\frac{3}{8}$ drachms) of a 25-per-cent. solution of hydrochloric acid, the reaction for free hydrochloric acid was obtained. To the same quantity of cows' milk it was necessary to add 15 or 16 cubic centimetres (4 to $4\frac{1}{4}$ drachms) of the same solution before getting a similar reaction; hence, he concludes that a child taking 1 pint ($\frac{1}{2}$ litre) of cows' milk daily would require 3 pints ($1\frac{1}{2}$ litres) of gastric juice to combine with all the salts in cows' milk; hence, there cannot be considered to be any germ-killing power in the gastric juice.

The lesions he believes to be secondary to the putrefactive processes. In older children the process is more likely to be limited to the stomach, because the food remains here a longer time and more digestion is carried on in this organ. In infants it is the intestine which is most involved.

TREATMENT OF DIARRHOEA.

Diet.—The subject of diet has received more than the usual amount of attention during the past year. The conviction seems to be growing that for the successful combating of the disease more care must be exercised, both in the preparation of the food and the manner of its administration. While nothing especially new has been proposed, it cannot be said that no progress has been made. During the early stages of acute diarrhoea there is far more danger of giving too much than of giving too little. The plan of "bold starvation" for twenty-four to forty-eight hours is universally commended. The use of milk during the more active stages is disapproved by nearly every writer. Some propose that no food whatever be given for many hours, especially in cases marked by a sudden onset with urgent symptoms.

Combe,¹⁹⁷ in cases beginning with very active symptoms, withholds all food for twelve or twenty-four hours. Water may be given, or water and brandy, or perhaps a little chicken-broth. When there is vomiting everything should be given cold. When milk can be retained by the stomach, it is to be preferred to other food, but must be given very largely diluted.

A point to be kept always in mind is the great loss of water which these patients sustain. Meinert⁵⁷ draws special attention to this fact. He allows water freely, or chamomile-tea, or fennel-tea, and also uses baths. As soon as feeding is begun at all, milk is to be used at first in the dilution of 1 part to 9 parts of water, gradually increasing the proportion of milk to one-quarter or even one-third. This is especially applicable to cases of the cholera-infantum type.

The subject is still complicated, and offers a field for a vast amount of observation and study. One of the most successful attempts to formulate rules for guidance in the prescribing of diet has been made by Rachford.⁵¹ Intestinal fermentation is usually of two kinds,—acid or putrid,—the former occurring with carbo-

hydrates, the latter with albuminoids. Theoretically, therefore, if the class of fermentation can be determined, the food may be easily selected. In acid fermentation an albumen is indicated; in putrid fermentation, a carbohydrate. Escherich's principle, that the character of the fermentation present may be determined by the reaction of the stools, is very unreliable in actual practice. Both kinds of fermentation may be going on in different parts of the alimentary canal at the same time. The stools will therefore vary in character from day to day. The odor is to be considered as well as the reaction, and is of greater practical importance. If the stools continue of the same character, they will represent with considerable accuracy the class of fermentation present.

Marked constitutional symptoms are evidence of the absorption of ptomaines, which are always derived from the decomposition of albuminoids. In another form of diarrhoea, marked by flatus, pain, and urticaria, acid fermentation is usually present.

As to foods, some are pure carbohydrates, others pure albuminoids, others are mixed; while some, like meat-broths, contain neither element, and may be safely given in any form of the disease.

The following general rules may be formulated:—

1. Avoid albuminous foods (*a*) when marked constitutional symptoms are present; (*b*) when in doubt as to the character of the fermentation causing the disease; (*c*) when the stools are putrid; (*d*) when the stools contain mucus and blood; (*e*) when nausea is constant and not relieved by vomiting.

2. Avoid carbohydrates (*a*) when there are no marked constitutional symptoms and the stools are continuously acid; (*b*) when there is much flatus, pain, and urticaria.

3. Give food such as cream, beef-broths, and whisky (*a*) when foods prescribed according to the above rules disagree; (*b*) during the first twenty-four hours in severe, acute cases; (*c*) when there is doubt as to the character of the food indicated.

Meat-broths contain so little albumen and carbohydrates that they are never theoretically contra-indicated.

Cream contains so little albumen, when properly diluted, that it is rarely contra-indicated. It serves its best purpose in chronic cases, and in later stages of acute cases.

Barley-water may be used alone or with milk.

White of egg is not indicated with constitutional symptoms, nor when the stools are putrid or mucous.

Meat-juice is one of the most valuable of the albuminous foods, and is very easy of digestion. It may often be given in chronic cases, when other albuminous foods disagree.

Milk must always be sterilized and be well diluted. Dilution will do more to render it digestible than any elaborate means of preparation.

Medicinal Treatment.—The tendency has for some time been toward the use of fewer drugs and smaller doses, and it has been especially marked during the last year. Many writers have abandoned the use of most of the drugs brought forward during the past few years. Some of the disinfectant drugs are still used, but their administration with the idea of disinfecting the alimentary canal has been abandoned, to the decided advantage of the patients. There is a tendency toward the more frequent and thorough employment of mechanical measures. Stomach-washing has found new advocates, and those who have had the largest experience in its use are its most earnest supporters. Thus far it has been most extensively employed in hospitals and asylums, and promises to become a permanent and valuable means of treatment. In private practice it is for obvious reasons less available. Irrigation of the colon is coming into more general use, both in hospital and private practice; it is noticeable that it is usually employed as an adjuvant to other treatment. While a few writers rely upon the regulation of the diet and mechanical measures, to the exclusion of all drugs, the majority are by no means ready to follow their example. The consensus of opinion seems to be that there are drugs of decided value in the management of these diseases; yet there is little tendency to attribute marvelous results to any one plan of treatment or to any one medicinal agent.

Numerous papers have appeared, detailing general plans of treatment; while they have contained little that is new or original, they are of considerable interest in showing the prevailing tendency. In many respects there is marked unanimity. At the outset of treatment an evacuant is almost universally advised in the later, as well as in the earlier, stages; for this purpose calomel and castor-oil would seem to be the favorites; at the same time, the diet is changed, all food being withheld for a time. By general consent,

opium and astringents should be withheld in the earlier stages and at the beginning of treatment in any stage. By some the stomach is at once washed clear of all food and curds, especially if there is vomiting, and the colon is cleared of decomposing matter by irrigation. In the later stages, bismuth, calomel, opium, and acids would seem to be in most general use. Vegetable astringents have been almost universally abandoned. Resorcin, salol, naphthalin, and bichloride of mercury have had fewer advocates during the year, and, judging from the literature, their use would seem to be much less than two or three years ago.

The use of opiates has in recent years largely decreased. They have a useful place, however, in the treatment of diarrhoea, and are not to be abandoned. Much opposition to the drug has arisen from a misapprehension as to its proper use. Several authors have written judiciously concerning it, notably Combe.¹⁹⁷ No drug requires greater discrimination and caution in its administration. It should not be administered until the alimentary canal has been freed of decomposing matter either by irrigation or cathartic drugs. It is equally contra-indicated when the passages are small and infrequent and are of bad odor, or when small passages are accompanied by cerebral symptoms or a high temperature. When its administration is followed by elevation of temperature or the passages acquire a bad odor, it should be discontinued or the dose diminished. The dose should always be as small as possible, sufficient being given to check peristalsis and relieve pain, but not to produce a marked narcotic effect. The method of administration is of the greatest importance. It should not be added to the usual diarrhoea mixtures, to be repeated at short intervals, even if the dose be small. The results are almost certain to be bad. It should be given entirely alone and at intervals sufficient to produce a steady and constant effect. This interval will vary from time to time, and it should be changed according to the symptoms. The size of the dose administered must also be adjusted upon the same principles.

The subnitrate of bismuth is more universally commended than any other drug, but larger doses are given than formerly. The dose should be at least 10 grains (0.65 gramme) every two hours, at 1 year. It is especially indicated when the passages are frequent and watery.

Salicylate of bismuth is commended by Alford,¹⁸⁶ but is condemned by Fruitnight,⁵¹ who believes it to be a dangerous drug. It has certainly not fulfilled the hopes that were raised when it was first proposed.

Calomel has found almost as many advocates as bismuth. It is used in a variety of ways, but in some form is almost universally commended. As an evacuant at the outset of treatment it is largely employed, especially if the stomach is irritable and will not tolerate other drugs. It is also given in small doses, frequently repeated, as a curative agent; as a rule, it is thoroughly triturated with sugar of milk and given in the form of powder or tablets. Thus, Collingwood¹⁰⁰⁰ gives $\frac{1}{16}$ to $\frac{1}{8}$ grain (0.006 to 0.01 gramme) every two or three hours. Combe¹⁹⁷ gives $\frac{1}{8}$ grain (0.01 gramme) every hour when there is vomiting, and $\frac{3}{4}$ grain (0.05 gramme) three times a day if diarrhoea is the most prominent symptom.

Creasote is highly spoken of by a number of writers as an efficient means in checking vomiting. It is given in doses of about $\frac{1}{2}$ drop.

Butterfield¹⁸⁶ employs it for diarrhoea with offensive stools. He administers $\frac{1}{2}$ drop in chloroform-water every hour or two. In his experience it has been most satisfactory.

The beneficial effect of acids in diarrhoea is quite generally recognized. In a series of 84 cases Crandall⁵¹ found them decidedly more efficacious than alkalies. Dilute hydrochloric acid was employed in doses of 1 to 2 minims (0.065 to 0.13 gramme) for each year of age, repeated every two hours. The good effects were most marked in cases of several days' standing, and especially in the so-called lenteric diarrhoea.

Arsenite of copper has been praised by several American writers, but in most instances experience in its use seems to have been very slight, and the observations as reported were certainly made without due care. It was given a thorough and scientific trial at the New York Infant Asylum during the past season. In a few cases only did it appear to cause any noteworthy improvement. After two months' trial it was abandoned as being inferior to older and better-known drugs.

Sanders⁵¹ states that he has used iodoform in over 800 cases, with a death-rate of $4\frac{1}{2}$ per cent. Unfortunately, no details of his cases are given, and as the iodoform was combined with bismuth

and opium it is impossible to attribute all the results to the first-named drug. It is used in powder, and can, he states, be effectually deodorized with burnt coffee. It is given to a child 6 months old in $\frac{1}{2}$ -grain doses (0.03 gramme) every two hours. Weber^{214 Nov.} reports a few cases treated with most gratifying results by this remedy. Three-grain (0.19 gramme) doses were administered in combination with small doses of opium. These results were achieved after other methods of treatment—bismuth and nitrate of silver—had failed.

Fruitnight^{51 Nov.} describes the treatment employed at the sea-side hospital of the St. John's Guild of New York, where a thousand very sick children are treated every summer. As little medicine is given as possible, but the chief reliance is placed upon sea-air, correction of diet, rest, and bathing. Bathing is considered one of the most important measures. A sponge-bath several times a day has a derivative effect upon the intestinal tract, and is a decided sedative to the nervous system. Reed^{59 Oct.} contributes 2 interesting cases in detail, and refers to others in which he has used tepid baths in cases of enterocolitis not attended by high temperature, but by extreme nervous symptoms. The latter were relieved in a striking manner after drugs had been extensively employed without any perceptible benefit. It is in regard to the sedative effect of the baths that the writer speaks especially in this article. He commends their use in this class of cases instead of limiting them, as has been done heretofore, to cases attended by high temperature.

CONSTIPATION.

Treatment by Manual Massage.—Karnitzky^{188 Jan.} has written quite an exhaustive article upon this subject. Drugs have in his experience proved of only temporary benefit in chronic constipation in children. Massage removes the cause which is the most frequent, i.e., atony of the muscular coat. It failed in no case in which it was thoroughly tried. It was done usually about 2 P.M., and a stool followed frequently within fifteen or twenty minutes after the manipulation, usually before evening of the same day. Five children with chronic constipation were treated daily for two weeks, at the end of which time the children had a good daily stool, and one month later had not been constipated once. Several cases are reported in detail. One, a girl 11 years old, in whom

the whole round of drugs had been tried without permanent improvement, the usual general symptoms of constipation being present. February 27th, massage begun. A great deal of abdominal tenderness, especially in the cæcal region; a hard, lumpy stool about three hours later. On the next day, a similar stool under the same circumstances. The third day, a movement two hours after the manipulation, a little softer, and general character improved. On the fifth day, a good natural stool. The massage was continued for thirteen days, at the end of which time the stools were regular, of normal character, and all the general symptoms had disappeared. This case is a fair illustration of the results which are reported. The writer obtained better results in young children, especially good in nurslings. It is essential in all cases that the massage be continued for two or three weeks, even though pretty prompt improvement followed the early manipulation.

The method of massage is described as follows: The hands should be clean, warm, and dry; the time selected, preferably before feeding or nursing, excepting in children who are very fretful, and where the abdominal walls become very tense on manipulation. Under those circumstances it may be carried on during nursing or feeding, as nothing can be accomplished while the abdominal walls are tense. The *séance* should not be usually more than ten minutes, and generally half that time is sufficient. The amount of pressure to be made depends upon the rigidity of the muscles. It is not necessary to use sufficient pressure to produce pain. A very light manipulation should be used at first until the child becomes accustomed to it. It was unnecessary to repeat it more than twice daily, and usually only once. The manipulation is made with the finger-tips, which are placed upon the skin of the abdomen, and not rubbed upon the skin, but moved about with the skin upon the intestines. Commencing in the neighborhood of the umbilicus, a series of concentric circles is made in this neighborhood until the central part of the abdomen has been well rubbed, this procedure occupying two or three minutes; then the descending colon along its whole course is manipulated in a similar way, more pressure being made in the downward than in the upward movement. More manipulation is needed in the left half of the abdomen, and especially in the left iliac fossa, than

elsewhere. Finally, the cæcum and the ascending colon are rubbed in the same way. In older children, tapping the abdominal walls quickly with the fingers, so as to induce a sudden contraction of the abdominal muscles, was found to be of value. The author does not claim infallible relief by this method of treatment, but the results which he reports would certainly encourage one to make a thorough trial of the method.

Vernon,¹⁸⁸ in the constipation which frequently follows diarrhœa, relies largely upon tonics. Strychnia stands first in efficiency. A combination of iron, quinine, and strychnia is very efficient. The bowels may be moved by calomel, given in $\frac{1}{16}$ -grain (0.006 gramme) doses, repeated four times, followed by a mild saline, or a glycerin suppository.

PERITONITIS.

Lydston,⁵¹ in an article entitled, "A Plea for Early Operative Interference in Acute Peritonitis in Children," makes the following points:—

He does not believe in the existence of acute idiopathic peritonitis, but thinks that upon careful inquiry the majority of such cases would be found to be traumatic; that slight injuries are relatively more dangerous in children than in adults; that acute peritonitis, when apparently idiopathic, is frequently secondary to perityphlitis, which may rapidly extend so as to involve the whole of the peritoneum, without appreciable local changes. Surgical interference is indicated in all severe cases of general peritonitis, and in cases of localized suppurative inflammation, or in cases of perityphlitis, whether foreign bodies are present or not. Operation in no sense increases the dangers, but, on the contrary, improves the condition of the patient to a great degree. No case should be allowed to go without operation, unless already in *articulo mortis*.

Congenital Peritonitis.—Ballantine³⁶ reports a case of apparent intra-uterine peritonitis. A child, without being manifestly ill, died thirty-two hours after a normal but somewhat prolonged labor. At the autopsy the intestines were found distended with fetid gas and fluid meconium, and there were evidences of extensive dry peritonitis of quite recent date. In the pelvis were signs of an older inflammation, especially about the right Fallopian tube.

CONGENITAL STENOSIS OF THE DUODENUM.

J. H. Emerson ⁵¹₁₈₈₄ reports a case with the following history: A child weighing $8\frac{1}{2}$ pounds (4 kilogrammes), apparently well until 30 hours old, when $\frac{1}{2}$ ounce (15 grammes) of blood was discharged from the mouth, with some choking and blueness of the extremities. This was repeated at intervals for eight or nine hours. There was a dark, tarry stool. The child refused to nurse, was given milk and brandy, and when 60 hours old swallowed a little better. On the fourth day, vomited a large amount of dark-brown, grumous fluid. Death occurred on the fifth day. Autopsy showed the stomach greatly dilated, the duodenum much distended and terminating abruptly just above the orifice of the common bile-duct. Fluid could not be forced from the stomach below this point, nor could air be forced upward from the intestines. In the œsophagus, immediately below the cardiac orifice, was a firm, dark-red thrombus in the mucous membrane, $2\frac{1}{2}$ centimetres in length, firmly attached to the posterior wall. This was deemed to be the possible source of the hæmorrhage.

ANIMAL PARASITES AND THEIR EFFECTS.

By JOSEPH LEIDY, M.D.,
AND
CHARLES S. DOLLEY, M.D.,
PHILADELPHIA.

PROTOZOAN PARASITES—RHIZOPODS, SPOROZOA.

Amœbæ.—T. E. Murrell, of Little Rock, Ark., calls attention to the announcement⁶¹ of his discovery, in 1885, of an amœba in the dejections of a healthy individual. He considers this amœba as corresponding very closely with the *Amœba coli* recently described by Massiatin, Osler, and others (*vide* ANNUAL for 1890, Sect. F., p. 1.). While the latter is described as occurring only in dysenteric discharges, the parasites observed by Murrell were passed by a person in perfect health. They were never found, however, in formed fæces, but at any time a saline cathartic would bring away myriads of them. The host was kept under observation, and the entozoa repeatedly examined over a space of several years, and up to the last were found in abundance.

L. Pfeiffer, of Weimar, has published a most timely and useful compendium for physicians and others interested in hygiene.¹¹⁰⁰ The chief types of cellular parasites, as revealed through the investigations of Bütschli, Leuckart, Balbiani, Aimé, Schneider, etc., are treated in this little book and rendered easy of diagnosis and classification by a well-prepared schematic table. After a careful consideration of coccidia and sporidia, the author treats of a third group, to which he refers the uncertain organisms found in the blood of man and animals, and the parasites of malarial fever, as studied by Laveran, Celli, Marchiafava, Golgi, and others. These organisms he proposes to include under the terms Hæmocytes and Leukocytes. An interesting portion of the work is devoted to the consideration of the Texas fever of cattle, while the last chapter deals with *Molluscum contagiosum* of birds and man. Both these diseases the author refers to protozoan parasites.

Sporozoa (Coccidia).—F. J. Lominski⁵⁸⁶_{No. 10} makes a contribution to the theories concerning the infection of human beings with sporozoa (coccidia). According to observations previous to 1890, the rabbit seemed to constitute the sole source of infection. This year Podwissotski⁵⁸⁶_{No. 1} discovered coccidia in a hen's egg, and supposes that infection may be brought about by eating raw or half-cooked eggs.

Lominski regards this as possible, although the coccidia of birds have been shown¹¹⁰¹_{p. 294} to differ from those of mammals, but believes there are perhaps many other sources of infection. He has observed coccidia in ham, and in a piece which he purchased in Kiew he observed symbiosis of the coccidia, with *Cysticercus cellulosæ*. Careful examination of thin slices showed small nodules of round or elliptical form, and of a dark-gray or brown color. The larger ones were of the size of a millet-seed; the smaller ones were only just visible in thin sections and with transmitted light as brown points on the red background of the meat. When hardened in alcohol, stained, and sectioned, these nodules showed themselves to be connective-tissue capsules, containing a finely granular mass in which were to be seen the egg-shaped sporozoa. These in turn consisted of thinner or thicker double-contoured capsules, round or elliptical. They were homogeneous and refractive, and contained from one to several round or elongated spores. In some nodules, broken capsules and free spores were to be seen, the latter resembling white blood-corpsules. The larger nodules showed the hooks and head portion of the *Cysticercus cellulosæ*, and in several cases cysts, with walls of vascular connective tissue, contained, besides the cysticercus, a number of coccidia capsules and spores. These he identified as *Coccidia oviforme*.

At a meeting of the London Pathological Society, considerable time was occupied in the examination and discussion of a specimen exhibited by Bland Sutton,²_{Dec. 21, '90} consisting of a kidney and ureter affected with coccidia saccules. Silcock described a case in which he had found them in the spleen, and suggested that, from the *prima facie* resemblance of the disease produced by coccidia to tuberculosis, their presence may often be overlooked, and they may be of much more frequent occurrence than generally supposed.

Payne referred to Ballinger's suggestion that molluscum

contagiosum might be due to low forms of animal life, perhaps of a psorospermial nature.

CESTODES (TAPE-WORMS).

Bothriocephalus.—Ch. Firket⁴⁵⁴ shows that there are on record only 4 cases of the occurrence of *Bothriocephalus latus* in Belgium. One case rests on the eminent authority of Ed. Van Beneden; another was reported 1889 by C. Vanlair; the third was reported in 1860 by Ch. Horion, and the worm preserved in the Museum of Pathological Anatomy of the University of Liège; while the fourth rests on a specimen in the collections of the University of Ghent, and concerning the history of which there are no records. This worm, so rare in Belgium, is somewhat more common in Holland and Bavaria, the shores of the western Swiss lakes, Italy, Russia, and particularly in Finland and the Baltic provinces, and is transferred to its human host from various fishes inhabiting tide-water estuaries and rivers and bodies of fresh water; and Firket indicates the fish largely eaten in Belgium, the brochet (*Esox lucius*), as the source of infection in that country.

F. Zschokke⁵⁰ shows that the *Bothriocephalus* larvæ found in *Trutta salar* may be distinguished, according to their size, shape of body, and the character of the contained lime bodies, as belonging to five distinct forms, and, in all probability, to as many different adult worms. He pictures five larval forms. They differ markedly from the well-known larvæ of *Bothriocephalus latus*, being smaller and with irregular outlines. In order to decide whether or not they were larvæ of *B. latus*, A. J. swallowed two living larvæ, fresh from the fish, without positive results of any kind. A developed cestode of the genus *Bothriocephalus* was found, and the experiment of transplanting them to the human alimentary tract gave only negative results. While Zschokke's investigations fail to show any such relations between the larvæ inhabiting the Rhine salmon and human beings as were established in 1889 by Ijima for the larvæ found in one of the Japanese fishes (ANNUAL, 1890, vol. i, F-6), he has nevertheless shown that *Trutta salar* is the host of larvæ of certain species of *Bothriocephalus*, and that the frequency of the larvæ in fishes of certain localities has a faunistic and biological basis which promises

to be of interest. Schimanski²¹_{Nov. 23} calls attention to the possibility of *Bothriocephalus latus* giving rise to all the symptoms of pernicious anæmia. He cites a case in point, in which rapid recovery followed the expulsion of three tape-worms. No mention is made of alteration in the blood; otherwise the case simulates pernicious anæmia very closely.

Tænia saginata.—Ludwig Oelkers,⁵⁰_{B. J. A. 308} in an interesting communication, describes a case of *Tænia saginata* in a syphilitic patient, where the proglottides contained a considerable amount of quicksilver. The patient had received, while in the Bremen Hospital, inunctions of mercurial ointment, 176 grammes of the ointment having been rubbed into the skin. The proglottides, passed by the patient before receiving tænicidal treatment, and the entire worm obtained by the exhibition of male fern, appeared perfectly healthy and in no way affected by the precipitation of mercury in their tissues. They differed from the normal worm only in having a peculiar drab color, which was evidently entirely due to the collections of mercury, and not of pigment, as previously described for the same worm by Leuckart. A joint, when pressed between two slides with glycerin, showed the ducts of the reproductive organs so filled with mercury as to lessen their lumen to a very considerable extent; while all the grooves and depressions of the surface presented repositories for the mercury, this being especially noticeable around the sucking disks of the head. Sections through the joints showed the parenchyma throughout to be stuffed with mercurial particles. Whether the chemical character of the deposit was sulphide or oxide was not made out. This appears to be the first case of the sort on record, although tape-worm in syphilitic patients is not an uncommon occurrence.

A. Laboulbène,⁸_{July} in a communication to the Paris Academy of Sciences, after pointing out the gradual increase in the frequency of cases of *Tænia saginata*, pointed out that the difficulty of recognizing the cysticerci of beef and veal was due to the fact that upon exposure to air the vesicles disappear with great rapidity.

Tænia solium.—Curtin reports⁷⁶⁰_{Jan. 11} a case of *Tænia solium* concomitant with advanced phthisis in a patient of the Philadelphia Hospital. Owing to the weak and emaciated condition of the patient, temporizing treatment was advised.

Laboulbène details,¹⁰ several experiments in which the proglottides of *Tænia solium* were administered to calves 2 months old. In the first experiment, March 13th, the segments were given entire in a mixture of water, milk, and flour. The second infecting dose, March 24th, consisted of proglottides cut into pieces and mixed with milk.

Microscopic examination showed that a drop of the milk, taken at an ordinary meal, contained from three to thirty onchospheres or hexacant tænia embryos. On the 19th of May, sixty-six days after the first ingestion of the tænia segments and fifty-five days after the second, an incision was made in the buttock of the calf and a piece of muscle removed. Microscopic examination showed semi-transparent, ovoid bodies, about the size of a millet-seed or hemp-seed. Examination with a lens showed that these little bodies consisted of a tough cystic membrane inclosing a second vesicle belonging to the cysticercus proper. The wound healed readily. Examination of the mouth revealed a prominence on the tongue due to an encysted cysticercus.

On the 30th of May, seventy-seven days after the first dose of tænia segments and sixty-six days after the second infection, the calf was killed and carefully examined. The visceral cavity showed no signs of cysticerci; nor was anything abnormal to be found about the brain, lungs, liver, spleen, thymus gland, heart, or diaphragm. All the muscular tissues examined presented cysticerci, those of the tail and the motor muscles of the eyeball included. The muscles of the neck and head and the intercostals seemed most infected, the slightest cut into the muscular tissue showing the cysts. Upon exposure to the air such cysts as possessed no fibrous investment dried up rapidly and soon became invisible. Where the cysts were themselves encysted they resisted exposure and remained visible for several days.

Owing to the calcareous particles about the neck of the cysticercus of *Tænia saginata*, these assume a white color upon drying, which allows the presence of the cysticercus to be made out after desiccation. Soaking of the dried beef containing the parasites again rendered them visible.

Echinococcus.—J. E. Allaben, of Argyle, Ill.,⁷⁷⁹ refers to the case of echinococcus described by Markham⁷⁷⁸ and reports another case, that of a woman 52 years of age, suffering from amenorrhœa

and prolapsus vaginæ, and who at different times passed echinococcus cysts from the bowels. Her history showed that nine years previously she had undergone laparotomy at Greifswald, Germany, when a large number of echinococci were removed and a diagnosis of echinococcus of mesentery, omentum, etc., confirmed.

Lacaze and Sabrazès¹⁸⁸ reported to the Bordeaux Society of Anatomy and Physiology a case of cysticercus in the shoulder, removed by Demons. Three cases of loss of sight from the presence of *Cysticercus intra-ocularis* are reported,^{353 50 254} 2 of which were relieved by operation and removal of the parasite.

Treatment of Tape-Worm.—The following tænifugal preparations are given²⁰⁰ Mar. 4:—

R Powdered flowers of kousso, . . . 20 grammes (5 drachms).
Water, 150 grammes (5 ounces).

Infuse the powder in the hot water, allow it to cool, and administer at one dose. Kousso is the tæniafuge *par excellence*, but it is not efficacious except in a fresh state; moreover, it has an extremely disagreeable taste. This we are able to remedy in part by prescribing—

R Kousso, 16 grammes ($\frac{1}{2}$ ounce);
Sugar, 32 grammes (1 ounce);

made into an electuary, which the patient can wash down with an aromatic infusion of some kind.

Davaine's kamala potion:—

R Tinct. of kamala, 6 grammes ($1\frac{1}{2}$ drachms).
Syr. of bitter orange-peel, . . . 20 grammes (5 drachms).
Aromatic Water, 120 grammes (4 ounces).—M.

If two hours after taking the potion the patient has not passed the worm, a dose of castor-oil proportionate to his age should be given.

Mixture of kamala and extract of male fern:—

R Kamala pulv., 10 grammes ($2\frac{1}{2}$ drachms).
Ext. male fern, 5 grammes ($1\frac{1}{4}$ drachms).

M. et div. in capsules no. xxviiij.

Four of the capsules to be taken every fifteen minutes.

Treatment by pelletierine (active principle of pomegranate-root bark): The patient should observe a proper diet and take a purge the day before taking the vermicide. The next day, fasting, he should be given 40 centigrammes (6 grains) of the Tanret tannate of pelletierine, in capsules or in the form of a syrup, as

follows, the tannate of pelletierine being generally preferred to pelletierine: 1. The patient, having been dieted, is given an injection for washing out the intestine, and immediately after a dose of from 25 to 40 centigrammes (4 to 6 grains) of the tænicide is given. 2. The patient remains lying down to prevent vomiting, vertigo, and disturbance of vision. 3. After half an hour or an hour a purgative is given, 40 to 60 grammes ($1\frac{1}{2}$ to 2 ounces) of castor-oil or 20 to 30 grammes (5 drachms to 1 ounce) of German brandy.

R Tannate of pelletierine, 40 centigr. (6 grains).
Simple syrup, 20 grammes (8 grains).
M. Sig.: To be taken at one time.

Generally the exhibition of the tænifuge is followed by a purgative (castor-oil or German brandy), but it is better to administer the purgative (castor-oil) a half-hour before the tannate of pelletierine. This medication sometimes produces vertigo and vomiting.

Lewis, of Grinnell, Iowa, ²⁰²_{Sept. 10} records a case in which he ineffectually made use of pelletierine and also fresh decoctions of pomegranate-root bark,—six different treatments, all told. The tape-worm was finally expelled (vomited) after the administration of kamala and oil of male fern, in capsules. Charles F. Denny, of St. Paul, ¹⁰⁵_{Nov. 1} also reports dissatisfaction with pelletierine, and recommends “Schafhirt’s prescription” :—

R Pomegranate, bark of root, 3iv (15 grammes).
Pumpkin-seeds, 3j (31 grammes).
Extract of male fern, 3j (4 grammes).
Pow. ergot, 3ss (2 grammes).
Croton-oil, gtt. ij.
Gum arabic, 3ij (8 grammes).
Water, ad 3viij (240 grammes).

M. The following directions should be followed: Give the patient a light supper, and in the morning a full dose of Rochelle salts, and let him fast until afternoon; then give all the worm mixture, having him lie down after taking and resist any tendency to vomit. In about one or two hours the worm will be voided entire.

Treatment by thymol (Gampi ²⁰⁰_{Mar. 1}): Administer the day previous, after a fast, 20 grammes (5 drachms) of castor-oil. Next day, fasting, the patient is to take 8 grammes (2 drachms) of thymol, divided into twelve doses, a dose to be taken every fifteen minutes, the last dose to be followed by the ingestion of a second dose (20 grammes—5 drachms) of castor-oil. As a rule, the tænia is expelled within a short time.

Treatment by chloroform: After a fast of twenty-four hours

the patient should take an emulsion prepared according to the following formula:—

- R Chloroform,
Ext. male fern, 4 grammes (1 drachm).
Castor-oil, 50 to 100 (1½ to 3½ ounces).
M. Sig.: To be taken at a single dose.

The chloroform may also be administered in the form of a syrup:—

- R Chloroform, 4 grammes (1 drachm).
Syrup, simple, 30 grammes (1 ounce).
M. Sig.: To be taken in the morning, fasting, in three doses, two hours apart.

An hour after the last dose the patient is to take 35 grammes (1½ ounces) of castor-oil.²⁹⁰
Mar. 4

Preparation of fresh pumpkin-seeds:—

- R Decorticated fresh pumpkin-seeds, . . 60 grains (4 grammes).
Make into an emulsion of 120 grains (8 grammes).
Add syrup of ether, 40 grains (2½ grammes).

The employment of this remedy is indicated in children and women of delicate constitutions.²⁹⁰ Samuel Lile, of Trinity, Alabama,²⁷¹ adds his testimony to the efficacy of pumpkin-seed for tape-worm. After fasting and the administration of the bruised seeds, he gives 1 ounce (31 grammes) of castor-oil, to which 1 drop of croton-oil has been added. Favorable notice is also given in Russia, as reported by Idelson.²⁸ 1102 1103 1104
June 2, p.16; V.1,p.307; V.2,p.351; V.2.

Treatment by male fern: A writer¹⁸⁷ gives the following outlines of treatment: Diet the patient the day before, and prescribe, for adults, capsules of male fern and calomel, as follows:—

- R Ext. male fern, 45 centigrammes (6½ grains).
Calomel, 5 centigrammes (¾ grain).

M. Sig.: Three capsules to be taken at a time, at intervals of fifteen minutes.

For adults it is advantageous to exhibit the male fern in a jelly prepared as follows:—

- R Ext. male fern (according to age of child), 3 to 6 grammes (¾ to 1½ drachms).
Calomel, 30 to 50 centigr. (4½ to 7½ grains).
Sugar,
Gelatin, 33 q.s. to render agreeable.

M. Sig.: A teaspoonful to be given every five minutes.

D. M. Theil announces,⁵⁷ the discovery in the bark of *Acacia anthelmintica*, known in Abyssinia as “moussena,” of a substance which he calls “moussenin.” This chemically resembles saponin. The powdered bark may be used as a tænicide, in doses of 40 or 60 grammes (1½ or 2 ounces), alone or mixed with honey or milk or as an infusion. The Abyssinians mix this pow-

der with flour and bake bread therefrom, which is eaten, for its vermifugal properties, in the morning, three hours before taking other food.

Hugo Engel¹⁷⁶ gives what his experience leads him to term the three remedies, "infallible in their vermifugal effects," viz.: For *Oxyuris vermicularis*, injections of decoction of garlic, followed by repeated washing of the parts where the worms congregate with a 1-to-2000 solution of corrosive sublimate. These applications must be continued for some time after the disappearance of the worms, with the occasional internal administration of a little garlic in the food, as well as the administration of cod-liver oil, which will prevent any recurrence of the parasites. Of all the remedies used for lumbricoids he gives preference to naphthaline, as follows:—

R Naphthalini, . . . 0.80 to 0.50 to 1 gramme (8 to 8 to 15 grains).
 Elæosacch. menth. pip., . . . 5 grammes (80 grains).
 M. f. pulv. no. x.
 Sig.: Four times daily, one powder.

He claims never to have failed to secure the entire tape-worm by the following: In the evening a light meal is eaten. At bed-time, about twenty minutes apart from each other, this medicine is taken, in two doses:—

R Olei flicis maris æther., . . . ʒii-ijj (8 to 12 grammes).
 Emuls. amygdal. dulc., . . . ad ʒvj (180 grammes).—M.

The next morning, early, about 5 o'clock, two tablespoonfuls of castor-oil are administered, and these followed, about an hour later, by another tablespoonful.

As the attention of physicians has only recently been called to the anthelmintic use of areca-nut and cocoa-nut, it seems proper to give space to a review⁸⁰ of their chemical analysis and physiological properties: "The fruit of the *Areca catechu*, with the leaves of the *Piper betel*, forms part of the masticatory or so-called betel-nut, so much used in the extreme East. The chemical composition of the areca-nut has been almost unknown until very recent times. Only recently Bombelon succeeded in extracting a volatile alkaloid, closely resembling nicotine, which he called arecaine, and which he describes as a colorless, oily body, with an odor somewhat resembling that of beef-soup, slight taste, but which becomes acrid and has a strongly alkaline reaction. It forms salts, and among them a salicylate, with an odor of tobacco.

According to Bombelon, this alkaloid augments the salivary secretion and diminishes the number of cardiac beats, and also has a purgative action.

Jahns, ⁶⁷_{Nov. 30, '98} further, has isolated three alkaloids from this fruit,—one which he terms arecaline, another arecaine, and a third which he only obtained in quantities too small to be capable of study. The first of these, arecaline, has a composition of $C_8H_{13}NO_2$, strongly resembling the arecaine of Bombelon; is an oily liquid, strongly alkaline in its reaction; soluble in water, alcohol, ether, and chloroform. The arecaline is stated to constitute the active principle of the areca-nut, and is the body to which its property as a tænicide is attributable; its composition and properties closely resemble pelletierine, one of the alkaloids extracted from pomegranate-bark, and which, like it, is a volatile liquid. The bromo-hydrate and chloro-hydrate of this alkaloid have been employed in subcutaneous and intra-venous injections, and even, by instillation, into the eye. The subcutaneous injection of $\frac{1}{3}$ to $\frac{1}{2}$ grain (0.02 to 0.03 gramme) will kill a rabbit in a few minutes, but the $\frac{1}{4}$ grain (0.01 gramme) is not fatal. The symptoms of poisoning with somewhat smaller doses closely resemble those of muscarine, an alkaloid extracted from the fungus agaricus. If the dose is not so large as to be immediately fatal it may be successfully combated by atropine. There are, however, certain differences between the action of arecaline and muscarine; areca, in small doses, diminishes the number of the heart-beats, and even is capable of arresting its pulsation in diastole. Its action may likewise be neutralized by atropine. Arecaline at the same time acts upon the respiration. Small doses increase the number of respiratory movements. Large doses arrest them, in fatal doses even before the heart is affected. Doses of $\frac{1}{4}$ grain (0.05 gramme), in medium-sized dogs, given subcutaneously, produce tetanic convulsions, which are followed shortly by partial paralysis, the animal being affected with vomiting and liquid evacuations, in which fragments of tænia are frequently found. Small doses especially increase the peristaltic action of the intestines in cats and dogs. Further, in the physiological action of this alkaloid there is extreme contraction of the pupil, which is also produced by instillation in the eye.

Arecaline may be found unchanged in the secretions and

excretions, where it may be recognized by its reaction with the double biniodide of potassium and bismuth, and by the fact that those secretions containing this alkaloid possess the power of arresting the heart of a curarized frog. It therefore appears that this is an extremely active substance, which deserves an important place in our materia medica on account of its action upon the muscles of the heart, its tænicidal and vermifugal properties, and for its peristaltic action upon the intestines. The alkaloid arecaine, in its physiological action upon animals and in its other properties, closely resembles methyl-nicotinic acid. As we have previously stated, areca-nuts have been recommended as a tænifuge, in the form of powder, in doses of 60 to 120 grains (4 to 8 grammes). It is claimed by Barclay that the tænia will be expelled three or four hours after the introduction of this remedy. Other authors recommend a dose of 225 to 375 grains (15 to 25 grammes) taken in milk, after having allowed the patient to fast for twelve hours, and then following up its administration by a purgative; castor-oil, infusion of senna, or any of the common purgatives may be used an hour or so after the use of the areca-nut; and since the latter is more active when the intestine is comparatively empty, it is evident that the diet for a day or two preceding should have been as restricted as possible. The areca-nuts are such a common article in commerce that there is no doubt that they can be readily obtained when any demand for them is created. It is advisable, however, that a certain amount of prudence should be used in giving the dose. The amounts given above may be entirely too much, especially if the statements as to the physiological action of arecaline are even partially correct, for Jahus has stated that one-tenth of 1 per cent. of the crude nut is formed by the alkaloid arecaline. The dose, therefore, should not exceed 60 to 90 grains (4 to 6 grammes). As yet no clinical studies have been made as to the value of this alkaloid arecaline. It would seem, however, correct to look for an equivalent of pelletierine in this substance.

A second tænifuge is the fruit of the *Cocos nucifera*, a substance which for a long time has been employed as a vermifuge in all countries where this tree is cultivated; thus, in Senegal, Martialis has employed it with good results, and numerous experiments have been made in France, which seem to prove that this substance has great activity as a tænicide, and confirms the state-

ment already made as to the common use of this substance in India. ²⁰⁶_{Dec. 18, '98} As to whether the cocoa-nut contains an active principle similar to arecaline or not is still unknown, and certain observers who have experimented with the cocoa-nut as a tænicide attribute the result simply to the indigestion which is produced when large amounts of the cocoa-nut are taken.

W. R. Allison, of Good Hope, Ill., ²⁰²_{Oct. 25} recommends cocoa-nut as a tænicide, apparently without knowledge of the fact that it has for some time ranked as a safe and efficient remedy. He reports a case in which a patient, after having successively tried pumpkin-seed, male fern, chloroform, and turpentine without bringing away the entire worm, was surprised to find that he had discharged a complete tape-worm after having by chance eaten a cocoa-nut.

NEMATODA (THREAD-WORMS).

J. G. Adams ⁹⁰_{Sept.} contributes an interesting article upon a tubercular growth rich in giant-cells, produced by a minute nematode. Among the numerous observations during the last thirty years of tubercular growths in various organs of the cat, dog, and other domestic animals, as well as man, produced around the ova larval or adult forms of parasitic nematodes, he quotes Colin, ⁹⁰⁴_{Aug. 4, '97} Saulanié, ¹⁰⁵⁹_{p. 49, '98} Albrecht, ⁹⁰⁵_{p. 177, '78} Heill, ⁹⁰⁶_{p. 28, '74} Manson, ¹¹⁰⁵_{p. 13, '77} Bewley, ¹⁶⁵_{No. 21, '97} Ebstein and Nicoläier. ²⁰_{p. 423, '98}

OXYURIS VERMICULARIS.

H. Senator, ⁴_{Feb. 17} calls attention to an interesting case recorded some time since, ¹¹⁰⁷_{Apr. 6, '78} but in such a manner as to be practically inaccessible. It is that of a 10-year-old girl in whose mouth numerous worms made their appearance each evening between 8 and 9 o'clock. The worms could be seen in considerable numbers wriggling their way rapidly along the surface of the tongue, from the base to the tip, where they were scraped off.

FILARIA SANGUINIS HOMINIS.

Joseph Bancroft, of Brisbane, the original discoverer of the adult *Filaria Bancrofti* (*sang. hom.*), ¹⁰⁰¹_{v. 23, '78} contributes an interesting paper ¹⁰⁰⁰_{Jan. '78} on filaria, in which he outlines the history of this parasite, referring to his discovery of the adult, and to its more recent finding by others, in elephantoid tumors, in hydrocele, and in the

human heart,⁶⁴²_{Feb. 1, '90}; also to the careful study of the development of embryos within the intestines of mosquitoes,¹¹⁰⁶_{Mar., '94} and previously, by Manson. How the parasite passes from the mosquito to the human subject has not altogether, to Bancroft, been satisfactorily traced, although he regards it likely that it is drunk in water. The fact that few cases of youth suffering from filaria in Brisbane are now to be found seems to show that the city water-supply is purer than the well- and tank- water formerly used. The new cases presenting themselves in Brisbane are from country towns where there is no public supply of drinking-water. Filariae whose embryos circulate in the blood may, in all cases, require the intervention of some blood-sucking creature to assist in their distribution,—mosquito, sand-fly, louse, or flea,—all of which need to be examined. Larval entozoa (of *Filaria immitis*) are readily found in the dog. The fly (*Stromoxys calcitrans*) absorbs from the dog's blood the embryo worms. It is still doubtful if embryos of *Filaria immitis* observe periodicity in activity as do those of *Filaria sanguinis hominis*.

P. G. de Saussure, Charleston, S. C.,⁶¹_{July 18, June 20}⁹ reports the clinical history of 22 cases of *Filaria sang. hom.*, observed by him in that city from 1886 to 1890. Tabulating the cases, he finds that the disease was distributed as follows: 9 colored males, 6 colored females; 5 white males, and 2 white females. Of the 22 cases 16 were in married people, all of whom had children. In over one-half of the cases filariæ were searched for in children of the married, in husbands or wives, or in friends and bed-fellows of the single ones; and yet but in a single instance did he find 2 cases in the same house, although the filaria would have been found in the child of another patient had the search been carefully carried on. As to the social conditions, 15 were colored, 7 white; of the latter only 3 could be said to be in high life; all of the others, black and white, belonged to the lower and middle classes. In reference to diet and water, the former differs in Charleston from that of the working classes of other cities only in that there they eat a great deal of fish; in fact, during the summer months, fish of some sort takes the place of meat. As to the drinking-water, Saussure differs absolutely from Guitéras and Bancroft, who consider the parasite to be conveyed by cistern-water. Saussure is assured, from ten years' practice among the lower classes, that it is

mainly pump- or artesian water only, and exceptionally cistern-water, that is used in Charleston. Sometimes, for a short period, just after rain-storms, the poor have barrel-water, but the supply soon runs out and they go back to the artesian wells. The barrel-water, being open to dust and dirt, shows, as does the artesian water, for that matter, which is stored up in open reservoirs, many living forms, of microscopic size, which were not identified. He suspects that the filaria of the dog is found in its larval condition in the flea, which may throw considerable light on the mode of infection. Although this fact has long been known, there is no history of the filaria of the dog (*Filaria recondita*, Grassi, and *Filaria immitis*, Leidy) having ever been found in man.

Osler⁷⁶⁴_{Apr.} reports a case of *Filaria sanguinis hominis* examined and reported upon previously by Guitéras.² The patient had exhibited the same symptoms for a period of some eighteen years. Osler referred to the doubt existing as to whether all cases of hæmato-chyluria are parasitic. He inclines to the belief that they are not, and cites cases to that effect.

Stephen Mackenzie,²_{Pres.} President of the Hunterian Society, exhibited specimens of the embryos of *Filaria sanguinis hominis* from a patient under his care in the London Hospital. The periodicity with which the embryos appear (commencing about 6 P.M.) was disturbed in this patient, and he had them swarming in the blood all day. Lancereaux read to the French Academy of Medicine a communication on filariosis sent by Maurel and Magalhaes,³_{Apr. 30} in which the latter point out the danger of surgical operations on this class of patients.

A case of chyluria, due to filariæ, is recorded by E. W. Weiss.⁷⁷⁹_{Oct.} The embryos were found in the urine, and disappeared in four days, following the administration of gallic acid. Weiss labors under the false impression that this is the first case of the kind recorded as originating in North America. Pierre Bernard⁷²⁰_{Jan.} contributes an interesting article on filaria and filariosis. He gives a history of the filariæ, attributing the discovery of the adult male to Silva Aranja and T. dos Santos, of Brazil, and to Sibthorpe, of Madras.² The female was discovered by Bancroft, and for many years was the only adult form known. He gives the following tabulated statement of the life-history of the parasite :—

EMBRYO.	LARVA.	ADULT.
1. Parasite of the blood of man.	2. Parasite of culex mosquito.	5. Parasite of the lymphatic vessels of man.
	3. Free in water.	
	4. Parasite of the alimentary canal of man.	

Diagnosis is based on the observation of soft tumefactions of the inguinal ganglia, of lymphatic varices of this region, a certain degree of elephantiasis of the scrotum, and hæmato-chyluric symptoms observed in an individual who had been living in a region where filariosis was prevalent; above all, to the detection of the embryo *filariæ* in the lymph and blood.

Inasmuch as the embryos alter their refractive index very rapidly in extravasated fluids, they soon become invisible. The examination of blood, lymph, or urine should, therefore, be made without delay. Prognosis is, as a rule, favorable to spontaneous recovery taking place sooner or later. A fatal termination is usually due to some intercurrent phlegmonous affection, induced, for example, by a forced march, scrotal erysipelas, or a surgical operation.

Prophylaxis and treatment consist in drinking, in those regions frequented by this parasite, only such water as has been carefully boiled and filtered. Since the impossibility of the larvæ penetrating through the cutaneous layers is not yet established, it might be well to avoid bathing in waters wherein mosquitoes deposit their eggs. The malady being developed, the physician is disarmed; symptomatic medication is useless, since we do not possess a single means of reaching the embryos in the blood or lymph. Nothing remains to be done but to maintain the patient's general tone until the adult parasites shall have ceased to exist.

DRACUNCULUS OR FILARIA MEDINENSIS.

E. Brassani, of Padua, ⁵⁸⁹_{Nov. 10} adds a contribution to the scanty account of cases of *Filaria medinensis* in Europe. The patient was an Italian soldier, lately returned from Africa.

Piot, a French veterinary surgeon, has just written a paper upon the presence of the guinea-worm among dogs, foxes, and jackals in Egypt. In a spaniel he found five worms, in a mastiff four, and in a jackal three. The worms present an aspect similar to that seen in human beings, and are always near the skin. Two

cases of the worm in dogs have recently been recorded by English veterinary surgeons.

TRICHOCEPHALUS.

Baumel¹⁷_{Sept. 20} reports his observations on a case of polyparasitism, in which the patient, a boy about 11, was suffering from the presence of tape-worm, whip-worms, and lumbricoids. Baumel attributes this polyparasitism and a concurrent dilatation of the stomach and cæcum to dirty and gluttonous habits of the boy.

Moosbrügger, of Lentkirch,¹⁸³_{Oct. 28} contributes an article in which he comments on the lack of attention given by physicians to the persistent anæmias due to intestinal parasites, and especially on the fact that, while many writers call attention to cestodes, nematodes, and anchylostoma as giving rise to symptoms resembling pernicious anæmia, they pass over the whip-worm (*Trichocephalus dispar*) as if a harmless inhabitant of the intestine. He then gives in detail the symptoms of a young patient in whom chronic diarrhœa and anæmia could not be accounted for in any way until a microscopic examination of the fæces showed the presence of myriads of the minute, hard-shelled, dark-brown eggs of the whip-worm. Santonine, calomel, extract of male fern, infusion of garlic, injections of tobacco, decoction of pomegranate-root bark were tried, with the poor result of bringing away but two examples of the parasite. Calomel and rhubarb, recommended by Gibson,⁶_{v. 2, p. 120, '90} and liq. ferri sesquichl. and other means were employed, entirely without success.

It was found that the child became infected with the worms by a habit of scraping up and eating the moist, cool earth in the garden. He points out the necessity for closer inspection of the stools in cases of obstinate diarrhœas, and expresses his belief that the whip-worm will be found to be more common than is supposed. The junior editor has found that trichocephalus is an exceedingly common parasite in the herbivorous animals of the Philadelphia Zoölogical Gardens, several cases having come under his notice where animals, dying after a history of chronic dysenteric symptoms, were the hosts of very large numbers of whip-worms, which had undoubtedly been the exciting cause of death. Lichenstein, of Cologne, estimated that the fæces of the little boy referred to above must have contained in each twenty-four hours 1,462,400

eggs. This shows the enormous fecundity of the worms, and the danger to which the public are exposed when consuming salads, radishes, celery, and other vegetables, usually eaten raw, and which have been cultivated in lands fertilized with the manure from zoölogical gardens or from the cess-pools of large cities, where there may be many more persons suffering from the presence of these parasites than has been hitherto suspected, since all the treatises on human parasites pass over trichocephalus as not of sufficient importance to deserve the attention of physicians.

DOCHMIUS (ANCHYLOSTOMA) DUODENALE.

J. D. Macdonald, of Ceylon,¹⁷⁴ contributes the translation of a highly valuable article by Adolph Lutz, of Brazil, dealing, comprehensively, with *Anchylostoma duodenale* and anchylostomiasis. He treats of nomenclature and classification; gives description of species, macroscopic and microscopic anatomical characters, means of distinction from other kinds of worms, mode of life of the adult parasite, etc. *Anchylostoma duodenale*, as the name implies, is found in the upper part of the small intestine of man; rarely in the stomach or large intestine. The principal seat of the parasites is the jejunum, where they avoid the direct effect of the bile. If an examination be made soon after death, all the parasites are found adhering to the wall of the intestine; to enable them to adhere, they suck up a portion of the mucosa into the mouth-capsule, by means of an elastic membrane at the bottom of the capsule, and fix it there by means of the pharyngeal teeth-like hooks, whilst the two style-like chitinous points at the bottom of the capsule penetrate the mucous membrane. Through movements of suction the blood *streams* into their intestines, being evacuated almost unchanged. Apparently the worm lives on the blood-plasma without interference with the blood-corpuscles; so that in its intestines an absorptive, rather than a digestive, process occurs. Supposing the daily requirement of each worm only amounted to 1 drop, the daily loss occasioned by 500 worms would amount to 20 grammes (5 drachms), which is sufficient in time to cause a pronounced form of anæmia.

Prospero Sonsino,¹⁵³ referring to the great number of Italian brick-makers in the province of Pisa afflicted with anæmia, due to anchylostoma, a social plague, which he ranks with malaria and

pellagra, so prevalent in Italy, offers the following suggestion for combating the endemic: 1. The erection of privies at each of the brick-yards, with stringent rules for enforcing their use on all the laborers, and the subsequent destruction or disinfection of the excrement. 2. The forbidding of eating during work, or about the working-place, and of putting the hands to the mouth until they have been washed in running water. 3. The drinking of filtered, or, better still, boiled water.

Observations seem to indicate that the duration of life of *Dochmius* is several years. Lutz¹⁷⁴ describes the development of the embryo, its growth, encapsuling of the parasite, calcification of the capsule, and further phases of development. Its occurrence outside the human race has been noted only in the gibbon (Levillant) and gorilla (Leuckart). The minimum duration of development seems to be about two weeks. After dealing with the transference of the larvæ to the human body, by dirt or infected drinking-water, the historical and geographical distribution of anchylostomiasis is taken up. Part II is devoted to the definition and diagnosis of anchylostomiasis and co-operating conditions. In connection with the pathology of the disease, he concludes as follows:—

“Meanwhile, what has been actually discovered enables us to come to a number of important conclusions, the following in particular: 1. With the presence of the *Anchylostoma duodenale*, there are met with, in the intestines, local lesions, consisting of small and large hæmorrhages in and under the mucosa. 2. In a number of cases there are found changes in the mucous membrane of the stomach and bowels, which must be looked on as chronic catarrh, with increased mucous secretion. 3. As a result of the local processes, there is observed poverty of the blood, which is frequently accompanied by dilatation and hypertrophy of the heart. 4. The whole organism suffers from disordered nutrition. This malnutrition of the whole system manifests itself in the individual organs by atrophic and degenerative processes.” He sums up the symptoms as follows:—

I.—STAGE OF PURELY LOCAL SYMPTOMS.

(a) *Acute Form*.

(b) *Chronic Form*.

The symptoms are similar in both forms. The disease is yet limited to pains and disordered digestion; no pallor, no rise of pulse.

II.—STAGE OF SIMPLE ANÆMIA, OR OLIGOCYTHÆMIA. (CHLOROTIC STAGE.)

(a) *Acute Form.*

1. Slight degree: Conjunctival vessels still visible; nails and lips pale red; pulse increased in frequency; no blowing murmurs over cardiac area.

2. Higher degree: Conjunctivæ devoid of vessels; nails whitish; lips pale; pulse-frequency very much increased. No blowing murmurs.

(b) *Chronic Form.*

Anæmia which has not reached the highest degree. In many cases distinct cardiac hypertrophy and dilatation; in other cases disordered valve-closure; seldom both combined. Moderate increase of frequency of pulse.

III.—DROPSICAL STAGE.

(a) *Acute Form.*

A high degree of anæmia; pulse small, much increased in frequency; no blowing murmurs; œdema of a hydræmic character.

(b) *Chronic Form.*

Symptoms of cardiac defects, with disturbed compensation, or of fatty degeneration; distinct symptoms of cyanosis; dropsy of engorgement; anæmia of varying intensity; disordered nutrition.

Lutz mentions only the ethereal extract of male fern as a therapeutic measure, but in an address by Prospero Sonsino, delivered at the General Meeting of the Hygienic Society of Florence, November 23, 1889, ¹⁷⁴_{Apr.} thymol is referred to as the almost specific remedy introduced by Bozzalo. Sonsino says: "I prefer it to male fern; I have already said so on many occasions, as the latter remedy proved uncertain in its results; on the contrary, I have always had to congratulate myself on the unvaried success of thymol. It has never failed me except in 2 cases, when I had not the same experience of the harmlessness of large doses, and in which the youth of the patients dictated prudence. I generally use it in sufficient dose to expel at one time all the parasites, and this dose, as a rule, is 8 grammes (2 drachms), divided into four parts, to be taken, one every hour, in wafer-paper. It is well known that thymol is almost insoluble in water, and therefore cannot be given in that medium, nor can it be given in alcohol, because in this it is more soluble and has an acrid action on the mouth and pharynx. The thymol should be finely powdered, with sugar and milk, and may be given shaken up with water or milk, no attempt being made to dissolve it. After each dose of thymol I allow a little good wine or a small dose of brandy, as Bozzalo recommends. I do not consider it necessary to follow the administration of the thymol by a purgative, because it seems better not to hasten the elimination, in order to give it time to come in contact with the worm, which it kills directly, as I have never yet found one alive among those expelled." It is recom-

mended to cause the patient to fast the previous day, and give an enema and aperient, so as to clean out the intestines, and thus to give a better chance to the remedy to come in contact with the parasite and to facilitate the examination of the fæces afterward. The opinion expressed by Schopf, of Hungary, that the larvæ are spread by air, and not by drinking-water or mud, based on experiments on dogs, is referred to, with the suggestion that these experiments should be repeated, as upon this point depends the question whether dochmias can be carried by winds and disseminated in other centres, or whether it can be carried only by man. In the meantime no one can doubt that the prophylactic measures to be taken against infection would be prompt and complete destruction of the fæces, either by incineration or by treating with dilute sulphuric acid. The junior editor would call the attention of American physicians, especially those of the Southern United States, to the fact that anchylostomiasis was long since reported as occurring both in America and the West Indies, Louisiana (Chalbert, 1830; Duncan, 1840), Alabama, and Georgia (Lyll, 1849). No recent observations seem to have been made, and a careful search for the eggs in the fæces of patients presenting symptoms of pernicious anæmia without apparently sufficient causes should be carried out.

STRONGYLUS GIGAS.

S. E. Nafiz-pacha, of Constantinople, ⁸⁷_{Apr. 20} communicates 2 cases of hæmaturia caused by *Eustrongylus gigas*. After having failed with all ordinary remedies, he administered santonine. As a result of this treatment the hæmaturia ceased and the patient expelled, three days after, worms measuring 6 centimetres in length. Recovery was complete. W. J. Green, of Fort Valley, Ga., ²⁰⁷_{Mar.} reports a case of hæmaturia due to the presence of nematode parasites in the kidney. After symptoms resembling renal colic, two worms were passed by the urethra, one measuring 3½ inches in length. The patient regained perfect health after the expulsion of the parasites.

TRICHINA SPIRALIS.

Lucian P. McCalla, of Taylor, Texas, ⁸⁸_{Apr.} reports 4 cases of trichinosis in children in which he obtained most favorable results by the use of salicylate of soda and antipyrin, giving almost imme-

diate relief to the great pains, and for the œdema he prescribed brisk purgatives and diuretics in small doses. All 4 patients recovered in less than three weeks.

ANGUILLULA OXOPHILÆ.

G. Lindner⁵⁰_{Nov. 22, '98}⁴¹_{July 9} contributes an interesting series of observations on the vinegar-eel (*Anguillula oxophilæ*, Schneider), with the purpose of deciding whether it may not be more harmful to the human organism than generally supposed. After a review of the history of this nematode, he refers to the parasitic varieties of the same genus, and quotes from Wiel's article on vinegar¹¹⁰⁸_{p. 178, '91} to show that practitioners have recognized the fact that these nematodes may act as irritants to the digestive tract, contrary to the opinion of the older writers that they were entirely harmless,—a teaching which seems to have been continued without questioning in the text-books. Lindner made a large series of experiments in which he not only cultivated the worms in various media, but in which many feeding-tests were made on warm-blooded animals. These all go to prove that the use of vinegar for cooling applications to wounds, antiseptic or hæmostatic gargles, etc., etc., should be only allowed when the vinegar is free from worms, inasmuch as he finds them capable of living for many days in the lower portion of the intestine and in the discharges of wounds. He recommends the use of wine-vinegar, or vinegar made from vinegar essence as prepared from beech-wood, according to Pasteur's process.

FACULTATIVE OR PSEUDO-PARASITES.

A case is reported by Landon, of Elbing,⁶⁶_{June 20} of a child dying from exhaustion following diarrhœa and vomiting due to the presence in the stomach of maggots of the horse-fly, *Tabanus*. Although it is stated that Chun identified these larvæ as belonging to genus *Tabanus*, there should be some hesitation in accepting the identification in this case, as no autopsy was made, nor were any of the larvæ reared to the imago stage, which should be done whenever possible in cases of this kind. The dipterous larvæ capable of living in the human stomach are, so far as known, confined to the family Muscidæ, and, according to Summa (ANNUAL, 1890, vol. i, F-23), to the genus *Anthomyia*, although it will be seen that Summa's conclusions are disputed by Senator and others.

H. Senator, of Berlin,^{4 Feb. 17} in a lecture delivered January 9th on living fly-larvæ in the stomach and mouth-cavity, describes an interesting case in which a young lithographer discharged from the mouth at different times several hundred maggots of the common house-fly (*Musca domestica*, L.). The larvæ were identified by Eilhardt Schulze, but, none being secured alive, it was impossible to rear the adult insects. Senator refers to the cases of pseudo-parasitism cited by Hugo Summa (ANNUAL, 1890, vol. i, F-23 to 25), and calls attention to several recorded cases overlooked by him in preparing his list; Valleix,^{1109 Feb. 11, '91} Jamaica fly-larvæ in the gums and cheeks; Laboulbène and Robin cite a case observed by J. Dubois, in which larvæ of an *Anthomyia*-like fly were discharged at stool and by vomiting; while W. Lublinski,^{99 No. 44, '96} Berlin, showed larvæ, identified by Deritz, Curator of the Zoological Institute of the University of Berlin, as those of *Musca domestica*. On the strength of the 2 cases, Lublinski's and his own, Senator disputes the generalization made by Summa, viz., that "myosis intestinalis is always caused by species of the genus *Anthomyia*."

Considerable interest was awakened by Senator's communication, which was followed by a discussion and several articles in the German medical press, the most important of which was that of Israel,^{4 Feb. 17} and Schreiber.^{4 May 1} The latter adds a case to the 2 cited by Senator, in which the larvæ vomited by a woman patient were identified as belonging to *Musca domestica*. The eggs were supposed to have been on some partially spoiled grapes eaten by the patient.

Jennings is quoted^{22 May 22, '96} as relating a case of a negro teamster from whose nostrils were removed over fifty screw-worms, larvæ of the blow-fly (*Musca vomitoria* or *Sarcophaga carnaria*), by means of a chloroform spray. Cases of maggots in wounds are recorded by Bakowski^{509 No. 13} and by E. F. Hosford.^{139 Sept.} Coronado^{459 May} has written an exhaustive article on the chigoe (*Sarcopsylla penetrans*, Westwood). After giving a list of technical and vulgar synonyms, and referring to the geographical distribution of this pest, the author deals with its anatomy, physiology, pathology, and treatment, which latter may be summed up in the words extraction and antiseptis. The red harvest-mite (*Leptus irritans*) seems to have been confused in the popular mind with the dipterous insect just described, judging from the article headed "The Chigger," by

H. M. Whelpley.²⁷¹ Evidently this is a corruption of the West Indian chigoe, chiggre, or jigger, all of which refer to a member of the flea tribe. Whelpley, after describing the mite in question, refers to C. V. Riley's¹¹¹⁰ account of the insect. The former believes that it is confined to the Mississippi Valley from latitude thirty-five to forty degrees. He speaks of the burrowing habits and haunts of the pest, and gives a list of methods employed in the treatment of sores produced by its penetration of the integument. Fat, salt pot-grease is stated to be the most popular application; and the junior editor would refer to the suggestion made in the ANNUAL for 1888, that if it is once understood that all insects, including lice, mites, ticks, etc., are quickly destroyed by asphyxiation by the application of any oil, physicians will no longer apply remedies of a noxious or irritating character to the patient.

REFLEX NEUROSES CAUSED BY INTESTINAL WORMS.

A case is reported by Houzé,⁴⁵⁴ from the *Hôpital militaire de Tournai* in which a soldier was completely relieved of recurrent epileptiform attacks by treatment for and expulsion of a specimen of *Tænia solium*. Viatcheslav A. Manassein,⁵⁸⁸ after calling attention to the frequent occurrence of *Oxyuris vermicularis*, *Ascaris lumbricoides*, *Trichocephalus dispar*, *Tænia solium*, and *Bothriocephalus latus* among the inhabitants of Russian towns, points out the necessity of a microscopic examination of the fæces in patients suffering from reflex neuroses. He enforces his argument by reference to 2 cases, one of a high police functionary, who, after suffering for several years from severe bronchial asthma, was relieved immediately and permanently by the removal of a tapeworm. The other case was that of a young girl who had suffered from frequent and increasing epileptic fits, followed by some mental derangement, and who was relieved of both mental and epileptoid symptoms by the successful administration of an anthelmintic.

A case is recorded¹⁸⁶ presenting frequent cataleptic attacks, which were completely relieved by treatment with santonate of soda and the throwing off of over 100 round worms.

Nikolai A. Parfianovitch, of Kalüga,¹¹⁰² reports a case of death resulting from asphyxia caused by complete occlusion of the

glottis by round worms. Four coiled ascarides plugged up the glottis, another was extracted from the left nostril, and another from the mouth.

Beaven Rake, of Trinidad,¹⁰⁰ records another case of death from asphyxia caused by a worm over the epiglottis, and a case of sudden death due to reflex action on hypertrophied and dilated heart, from the presence of round worms in the stomach and intestine. He refers to 3 similar cases previously reported, viz.: 1. Fatal convulsions due to round worms. ² Jan. 9, '98 2. Asphyxia from round worms. ² June 11, '98 3. How do round worms cause convulsions? ² Mar. 24, '98

Giacomo Arrigossi⁵⁰⁵ records a case of obstinate vomiting, accompanied by enormous dilatation of the pupils. All methods of treatment were without avail until the last-named symptom suggested reflex irritation of the pneumogastric. Santonin was given with splendid results; the vomiting and dyspeptic symptoms ceased, appetite returned, and the patient was completely cured.

Isador Palmai, of Buda-Pesth,⁵¹² reports a case in which tape-worm apparently caused dysmenorrhœa and sterility. Upon the removal of the worm the patient soon lost the unpleasant feeling she had had, and the depression of spirits. She conceived almost immediately, and was delivered by means of forceps, after a protracted labor, of a healthy child. Since then menstruation has been quite painless. Palmai considers that the dysmenorrhœa and sterility, as well as the subsequent unsatisfactory labor-pains, were due to the prior influence of the tape-worm on the nutrition, circulation, and innervation of the uterus.

A perusal of the statistics of helminthiasis, as presented by Gretchankoff,¹⁰⁰⁹ Baranorski,¹⁰⁰⁹ and Kessler,¹⁰⁰⁹ not only gives a strong impression as to the great frequency of helminthiasis, but also of the necessity of a careful examination of the stools in all etiologically obscure cases of anæmia, emaciation, and gastro-intestinal or nervous disturbances. The attention of practitioners is particularly called to this, as the statistics taken from over 2000 cases show that an overwhelming majority of helminthic patients are absolutely unsuspecting of their condition.

MISCELLANEOUS.

G. Bunge, of Basel,⁸³ communicates the result of his experiments on the respiration of worms. This is a continuation of

an investigation begun in 1883.⁸³ The experiments on parasitic worms included *Ascaris mystax*, from the cat; *Ascaris acus*, from the pike; *Ascaris megacephala*, from the horse; *Ascaris lumbricoïdes*, from the hog.

They were all known to be capable of existing from four to seven days in media absolutely destitute of oxygen, and during this time to keep up lively movements and the excretion of a considerable amount of carbonic dioxide. The experiments on free living worms, also the continuation of a former series,⁸³ were made upon such forms as inhabit slime, where the conditions, so far as free oxygen is concerned, are analogous to those to which intestinal parasites are subjected.

Dendrocoelum lacteum, *Aulastomum gulo*, *Clepsine binoculara*, all lived for two days after withdrawal of the oxygen. *Nephelis vulgaris* lived from two to four days, *Clepsine complanata* three to five days. *Gordius aquaticus* presented a peculiar behavior, in that it soon ceased its movements and became apparently dead, but could be revived after remaining for twenty-four hours in this condition by bringing it again into contact with atmospheric air.

Anguillula aceti resisted the absolute withdrawal of oxygen for seven days. Bunge suggests that intestinal parasites are probably developed from organisms which, in their free condition, are anaërobiotic. Thus, the habitat of the slime-worms fitted them for becoming parasitic. Their ancestors were in turn oxygen breathers, which is confirmed by the fact that the eggs of parasitic nematodes will not develop without oxygen, whence it is that the intestinal parasites which find suitable conditions during their adult stage pass the young stage free.

The junior editor would call attention to the fact that infection with *Filaria immitis*, *Eustrongylus gigas*, and *Dochmius duodenalis* takes place almost entirely in regions of swamp or morass, or wherever there is a damp soil.^{50 174}
p. 8, Jan., Apr.

PARASITES IN EGGS.

A. Kronfeld⁸⁴ refers to the discovery by Chatin, in a hen's egg, of threads about 8 centimetres long, having all the characters of *Ascaris inflexa* (which lives in the intestines of chickens). *Distomum ovatum* has been found in hens' eggs by Hanow, Pur-

kinje, Eschholz, and Schilling. As already stated, Podwissoteki discovered coccidia in hens' eggs.

URINALYSIS AND DIABETES.

By ALLEN J. SMITH, M.D.,

PHILADELPHIA.

URINALYSIS.

ALTERATIONS IN QUANTITY.

Polyuria.—This condition finds expression in various pathological states, in which, however, there may often be traced a necessity for the increased activity of the kidneys in the presence of an abnormally existing matter demanding excretion. Thus, for example, may be cited the critical discharges of the various fevers, the polyuria of diabetes mellitus, the polyuria following polydipsia, or the polyurias of mechanical origin. Many of these, from the nature of things, are of brief duration, and may be periodic from the character of the causation. Oppenheimer ⁶⁹_{Nov. 13} calls attention to the periodic character of many of these forms, citing 2 cases, 1 of which seems to be due to the periodic relief of a hydronephrosis caused by a wandering kidney. The other case is, however, peculiar. An old woman, of considerable physical power, and in fair general health, was noticed through several attacks which tended to depreciate her general condition. These attacks, invariably appearing at night, began with a frequent necessity to micturate, the polyuria continuing at intervals of several minutes for two or three hours, the quantity passed being in all 4 or 5 litres (4 or 5 quarts) during this period. The urine was clear, straw-colored, with but little deposit, and quite free from sugar and albumen. Following this there appeared an exceedingly painful, cramp-like condition in the limbs and feet, lasting for about ten minutes; and the patient seemed in imminent danger of collapse. This condition over, the patient each time fell asleep, and upon waking felt almost as usual; but in place of the polyuria, oliguria supervened. The urine in these latter periods was dark red in color, with heavy uratic deposit, and under the microscope showed some crystals of uric acid in addition; but no other pathological sub-

(G-1)

stances were discovered. No tumor could be recognized suggesting a hydronephrosis, and there were no colicky symptoms; and the writer is disposed to look upon this case as one of a pure polyuria of a periodic nature. The subsequent symptoms of the attack are explicable upon such a hypothesis; and, although rare, there does seem from this case (a similar one is recorded by Scholz ¹¹⁵⁰₇₃) to be a distinct form of diabetes *insipidus* of periodic nature. The character of the urine after the attack is what would be expected after considerable loss of fluid from the tissues by excessive sweating or by a profuse diarrhœa; and the cramps suggest strongly those appearing in the latter stages of Asiatic cholera. The periodic nature of the malady is quite analogous to the intermittent cases of diabetes *mellitus*, both suggesting a neurotic origin. A further similarity between these two forms of diabetes is met with in a case presented by Mosler, ⁶⁰_{Mar. 8} in which there was associated with the polyuria a condition of general adipose deposit in a young girl aged 16 years. Another case with a similar trend of suggestion is described by Lowinsky, ⁶¹_{July 19, 91} during the course of which furuncles broke out on the loins, back, and thigh. The urine amounted to about 7 litres (7 quarts) daily, of an average specific gravity of 1004; and the writer concludes that there is a distinct relation between the polyuria and the trophic disorders of the skin.

Nothnagel ²²_{Sept. 3} presented a case of polyuria occurring in a man who several weeks before had fallen and struck the back of his head upon the ground. The first symptom developed after this fall was a polydipsia, followed by polyuria, an average of 4 litres (4 quarts) being passed daily, this amount corresponding fairly with the amount of water ingested. As a result of the injury, too, there was almost total deafness upon the left side. Regarding the case as one of a polydipsia of nervous origin, the lecturer gave a favorable prognosis, and suggested the employment of the galvanic current in moderate strength from the back of the neck to the forehead, blisters or a seton to the back of the head, to aid in the absorption of a possible clot in the medulla, together with such remedies as opium, or, better, codeine and strychnia, to allay the sensation of thirst. A case recorded by Edgren, ³⁷¹_{v. 21, No. 3} and mentioned by Eklund, of Stockholm, corresponding editor, may prove of value in locating the pathological seat of some of the cases of nervous origin. The patient, a young man of 25 years, had suf-

ferred from some pustular affection about the legs, arms, and neck, probably of a scrofulous nature, in his early life, but otherwise was healthy until in his 19th year, when he suddenly began to suffer from dyspeptic symptoms, and within a week had violent headache, a feeling of pressure in his head, vertigo, intense thirst, and excessive excretion of urine. Upon admission to the hospital at this time there was a facial paresis of the right side, involving the areas supplied by the two inferior branches of the facial nerve. When the tongue was protruded it went to the right side. There were no other motor or sensory disturbances. Although the patient denied syphilis, the administration of iodide of potassium was of marked service in clearing up these symptoms, and after about four months in the hospital he left much improved. The cerebral alterations again becoming manifest, he returned in about a year, and under the same treatment again improved. Three years later he entered the hospital a third time with advanced bilateral pulmonary tuberculosis, with marked polydipsia, a polyuria amounting to 10 or more quarts (litres) of urine in the twenty-four hours, œdema of the legs, albuminuria, and periodic attacks of diarrhœa. After death it was found that the inferior portion of the lenticular nucleus and the anterior portion of the internal capsule were destroyed; but there was discovered no other lesion of the central nervous system. There were cavities in the lungs, syphilitic hepatitis and perihepatitis, and amyloid change in the spleen, kidneys, and intestines. Stewart¹³⁰ exhibited before the Medico-Chirurgical Society of Montreal a case of very similar bearing in a man of 40 years, passing an average amount of 100 ounces (3017 cubic centimetres) of urine in the twenty-four hours, and presenting also a paresis of the respiratory branches of the left facial nerve, atrophy of the left anterior portion of the tongue, and paresis of the left half of the palate.

Lecorché and Talamon,⁸¹ contribute a valuable article upon this same feature in the etiology in their paper upon syphilitic polyuria. This paper is based upon 2 cases, the first of which, having acquired syphilis in 1879, first manifested nervous symptoms in 1882, which indicated a localization of the malady in the medulla, and which yielded to the employment of iodide of potassium. Two years after, however, there appeared suddenly a polyuria of 5 or 6 litres (5 or 6 quarts), increasing to 9 or 10 litres (9

or 10 quarts) during the day and night, accompanied with vomiting, loss of appetite, general nervous excitability, with exaggeration of the patellar reflexes. He rapidly lost flesh and strength, was confined to bed, and developed cervico-dorsal neuralgia, with radiations along both arms, and presently epileptoid spasms confined to the arm and leg of the right side. Under large doses of potassium iodide these symptoms gradually disappeared, except the polyuria. The second case had had syphilis five years, and, with the polyuria, amounting to 5 or 6 litres (5 or 6 quarts) in twenty-four hours, gave evidence of a probable localization of the syphilis near the origin of the trigeminal nerve of the right side in the presence of trigeminal neuralgia, radiations to the right arm, and trophic complications of the nostril and gums of the right side. From these cases the writers conclude that syphilis has a positive influence in the production of diabetes insipidus, that the polyuria results probably from a sclero-gummatous localization in the neighborhood of the floor of the fourth ventricle, possibly from syphilitic lesions of the vessels in that region. This polyuria, in their experience, is preceded or accompanied by nervous phenomena due to the irritation of the nervous cords which proceed from the bulbar protuberance; these nervous symptoms may persist or disappear, but the polyuria is apt to remain as a single symptom of bulbar syphilis in spite of treatment. In several cases of diabetes mellitus in nursing infants, observed by Rachel,¹⁵⁰_{Oct. 10} there was recorded a preceding gastro-intestinal disturbance. In 1 case there was a history pointing to heredity, and in all 3 there was present furunculosis,—a condition explained by the author by supposing the absorption of septic matter from the enteric inflammatory areas, with subsequent infarctions. In the treatment of diabetes insipidus, Maslowski⁵³⁰_{Nov.} obtained material improvement in a case whose urinary excretion greatly exceeded the water ingestion from the exhibition of antipyrin. Lindsay,²_{July 26} in a case of a woman aged 38 years, passing 250 to 300 ounces (7394 to 8873 cubic centimetres) of urine daily, after failing with valerianate of zinc and codeine, succeeded in overcoming the condition by the administration of valerian extract in 5-grain (0.03 gramme) doses, three times daily, for somewhat more than a week.

Oliguria and Anuria.—These terms are clinically associated with a true lack of urinary excretion, with a fault of the renal

function; but under the same head may be classed here for convenience those temporary diminutions in the visible urinary excretion resulting rather from retention of the fluid already excreted from the kidneys than from actual suppression of the function. Mollière²¹¹_{Mar. 16} describes a form of urinary retention in elderly men which is apt to be mistaken for retention from enlarged prostate, but which differs essentially from the latter condition. The condition is due, in his view, to the dilated condition of the veins of the vesico-prostatic plexus, which, by actual pressure, is able to produce the closure of the prostatic urethra. This hæmorrhoidal condition is quite analogous to ordinary enlarged and inflamed hæmorrhoids, and seems to be due especially to a temporary distension of the bladder, to the irritating quality of the urine, and to the tenesmus consequent upon this property. The symptom is apt to develop in elderly men after some indiscretion in diet; there is much pain, but little, if any, fever; rectal examination causes pain and reveals a general, diffuse, easily-compressible tumefaction in the prostatic region. Great care is demanded in relieving the condition, and if there be much difficulty in catheterization, or if the latter operation should lead to any hæmorrhage, supra-pubic aspiration should be practiced. The constant danger in these cases is that of inducing thrombosis, which is peculiarly apt to be septic. Diday²¹¹_{Mar. 22} adds to the causes influencing the determination of this condition in old men, the venous engorgement following the incapable sexual excitement of these subjects. Englisch⁵⁷_{Nov. 17} divides cases of chronic retention of urine into two classes: those in which there is relative insufficiency of the vesical muscles, and those in which this insufficiency is absolute. The further consequences of the resulting urinary retention are those of reaction, not only upon the bladder, but upon the rest of the urinary organs and the structures immediately surrounding the distended bladder. He urges, as stimulants to the vesical walls, warm baths, or cold to the perineum, and catheterization, the urine being drawn off very slowly.

A case of interest is reported from the Royal Survey County Hospital,⁶_{Jan. 11} under the care of Butler, in which suppression of urine lasted for thirteen days after a blow in the abdomen. At autopsy the right kidney was found to weigh but 120 grains (78 grammes), cystic, and of little or no functional value; the left kidney en-

larged, adherent, and the ureter distended with urine and plugged by inspissated thrombi. Féréol⁷³_{B.188} has brought forward a case of complete suppression lasting for eight days in a gouty patient, without any especial uræmic symptoms, followed by the passage of a small calculus, about the size of a pea, and a marked polyuria. Guyon²⁶⁶_{Nr.} has studied experimentally the secondary effects of obstruction to the outward flow of urine from the bladder. Septic presence in such cases leads to elevation of temperature and generalization of the septic condition; congestion involving the kidneys, the ureters, bladder, prostate, and the urethra were observed in animals in whom retention had been induced by ligation of the urethra. The bladder epithelium, from distension of the viscus, was detached in areas, exposing surfaces for absorption and extravasation. Inert particles and micro-organisms in these cases readily pass backward from the distended bladder to the kidneys. General poisoning is induced by the absorption of the urinary matters in the urinary passages, and by the constantly-increasing products of tissue change which fail to be excreted by the kidneys because of the excessive pressure of the retained fluid in the bladder, ureters, pelvis, and renal tubules.

In the dosimetric treatment of mechanical retention, Cassius,¹²⁹_{Jm.} Ceuterick, Juhel, Bonsirven, Lemarié,¹²⁹_{Jm.} urge the use of granules of hyoscyamine and of strychnia: the first with a view of overcoming any spasm, the latter of stimulation of the atonic vesical muscles. Krajewski⁶⁴⁰_{Nr.4} recognizes the two forms of retention mentioned above by Englisch, and urges in the treatment of the condition these points: the anatomy of the urinary tract, the instruments and their sterilization, the method of instrumental entrance into the urinary tract, the nature of the natural and acquired obstructions to the entrance, the circumstances of the retention, the results of the catheterization if badly performed, the methods of relief in the easiest possible manner. Lowe,²_{Nr.22} in the treatment of several cases of retention, one from prostatic enlargement, another from vesical atony, successfully practiced supra-pubic aspiration, with the placing of a drainage-tube into the bladder and leaving it for some days, until the obstructing cause in the one case and the weakened condition in the bladder-wall in the other had sufficiently subsided to permit the withdrawal of the drainage. A very small tube was employed and the opening was readily closed by healing, no urine

having escaped along the outside of the tubing, the primary opening having been made by a trocar and canula, and the drainage-tube having been inserted through the canula. Ashhurst,⁹ in a case of retention from stricture of the urethra, introduced first a filiform bougie, over which a tunneled catheter was passed and left in the urethra for a time.

COLOR OF URINE AND URINARY COLORING SUBSTANCES.

The position taken by Rosin, as stated in the last edition of the ANNUAL, in relation to the nature of the red coloring matter in Rosenbach's Burgundy-red reaction, is assumed by Rosenbach,⁴ in a further article upon this subject. This reaction, it may be recalled, is induced in the urine of patients in whom there is an imperfect digestion of the albumens in the intestines, occurring in intestinal cancers, ulcerations, and in the severe and prolonged diarrhœas of inanition, and failing in peritonitis, simple or tubercular, in habitual constipation, and in gastric maladies not associated with intestinal lesions. It is obtained by the addition of nitric acid to boiling urine. This second article of Rosenbach's is directed against the views of Salkowski, who assumed that the color was the product of the action of the acid upon a number of urinary aromatic substances, and who stated that it might be obtained in the urine of patients suffering from very varied maladies, and even in the normal urine. Rosenbach claims that the intense Burgundy-red color is not identical with the ordinary coloring matters: that it is due to two substances,—a red one, which is indigo-red, and a brown one, which is a mixture of indigo-brown, urobilin, and certain nitro-products of phenol,—and that the reaction which he has described is quite different from the ordinary urine change occurring upon the addition of nitric acid. The reaction does not indicate absolutely, in his opinion, any organic disease, but an especial condition of albumen digestion, in which the resorption of the easily combustible albumens and the secretion of the intestinal glands is hindered. Inasmuch as it obtains under the same circumstances as does indigo-blue, there should be insisted upon the presence of a shade of blue coloring matter in proper (transmitted) light. Its best value is rather in relation to prognosis of an already established disease, its appearance being regarded by the author as clearly indicative of digestive anomaly in relation to

the albumens; and its diagnostic worth is naturally greatest in association with other disease phenomena.

The results of Ewald,^{84 41} already mentioned, also are confirmatory of the position of the discoverer of this reaction. Abraham, an assistant of Salkowski,⁴ in an experimental study of over 300 cases of various diseases, febrile and non-febrile, intestinal and in other parts of the organism, has decided against the value of the reaction in relation both to diagnosis and prognosis. He states also that it may be found in the urine of healthy persons, and that it seems to depend upon the nitro-products of the indol and phenol compounds which result from the destruction of the albumens; that the conditions of its occurrence are not only present in intestinal diseases, but in diseases of other organs as well, and, too, in normal digestion.

Urobilinuria.—Hayem¹⁰⁰ considers that urobilinuria, if persistent, is of pathological significance, particularly in forming an early diagnosis of hepatic incompetence. He has noted the urinary condition at the beginning of cirrhosis of the liver, in cardiac cases where hepatic lesions are imminent, in numerous acute affections in alcoholic cases, as typhoid fever (when the urobilin is present in large amount the prognosis should be reserved), in newly-delivered and nursing women, in most forms of cachexia. It is to be recalled that urobilin may be present in considerable amount, owing to its feeble coloring power, in relatively pale urines. Mya,³ has recognized the presence of this substance in the urine of cases of pneumonia, febrile polyarthrititis, typhoid fever, in anæmias, and in cases of poisoning by pyridine, antipyrin, acetanilide, and other similar substances. Whenever the disease works to the destruction of the red blood-cells urobilin is always present in abundance. In grave conditions of the liver it is present, according to this author. In serious renal affections it is not found so much in the urine as in the blood.

Hæmatoporphyrin.—Rankin and Pardington⁶ detailed 2 cases in the urine of which this substance was recognized by spectroscopic analysis. Both of these cases were thin women over 40 years of age; both with catamenial disturbance; both single; neurotic, dyspeptic, with anorexia, vomiting, constipation. There was no evidence of poisoning. Drainage in their homes was good, and they were not related. The urine in each case was intensely

red, and on standing separated into three zones, the lower one consisting of highly-colored urates, the middle of a gummous character, with dark-chocolate color, the upper layer clear and deep red. The odor was peculiar, like that of freshly-killed meat. The urine was highly acid, specific gravity 1030 and over, with complete absence of albumen, sugar, bile, and blood, and under the microscope only masses of urates and uric-acid crystals were detected. The authors do not indicate any theory as to the direct etiology of the symptom.

Melanuria.—Von Jaksch⁶_{Dec. 14, '98} concludes that the most delicate reagent for the recognition of this condition is a dilute solution of ferric chloride, coloring the urine black in a blackish-brown cloud. After filtration, fresh addition of the reagent gives rise to a dark color and a light precipitate. With an excess of perchloride the gray precipitate is dissolved and the black precipitate remains, and is only dissolved by a very large quantity of the reagent. The coloring matter thus precipitated is a mixture of different substances. It is soluble in hot formic and in lactic acid. It is insoluble in acetic acid, chloroform, glycerin, etc. It contains iron, nitrogen, and sulphur. With ferrocyanide of sodium and carbonate of potassium the urine gives a rose color if the solution be dilute, and a dark-red color with concentrated solutions. Mineral and organic acids change this to a deep blue, and after a time a precipitate forms. This precipitate, separated by filtration, dissolved in carbonate of soda, and treated with hydrochloric acid and perchloride of iron, gives a precipitate of Prussian blue. This last reaction is not peculiar to melanin, and is only confirmatory after this substance has been determined by perchloride of iron. The discovery of melanin in the urine is of some value in the diagnosis of melanotic tumors.

Indicanuria.—Marten¹⁰⁰⁰_{Jan., '99} reports 6 cases in the urine of which indican was pronounced, all having some intestinal trouble save one, a drunkard with fits. He states he has never been able to detect indican in typhoid-fever urine, except in slight traces, where there is constipation. He recommends for the detection of the symptom that the urine be warmed and to it be added yellow nitric acid, when a dark-brown color is produced, becoming black upon further addition of the acid. Hochsinger,¹¹²_{Oct. 5, '12} as the result of numerous investigations upon the indican reaction in infancy, con-

cludes that the urine of the newly-born is free from indican ; that during the entire period of infancy in normal children, whether fed by the breast or artificially, at best only traces of indican may be recognized in the urine, and in most cases it does not occur at all ; that in the simple diarrhœas and dyspepsias, as well as in the ordinary constipations of infants, indican is absent from the urine ; in the gastro-enteritis and cholera infantum it is increased ; excluding primary intestinal or general septic diseases, the presence of pathological quantities of indican is indicative of grave intestinal disturbances or grave general functional change, especially tuberculosis. Bohland ⁶⁹_{Nov. 3} has, from experiments upon dogs, concluded that indicanuria may be referred to the exhibition of thymol as an indol-forming substance.

OTHER GENERAL PHYSICAL PROPERTIES.

Temperature of the Urine.—It is suggested ¹⁸⁶_{Apr.} that the temperature of the urine be taken immediately after voiding, with a view of a possible diagnostic value, in cases where the urine has been in contact with inflamed areas in the urinary tract.

Specific Gravity.—A urinometer is exhibited by Max Wocher and Son, ⁴²⁸_{June} consisting of a glass tube open at both ends, and containing four beads of different colors, having different degrees of gravity, ranging from 1015 to 1030. The tube is placed in the urine, which enters, and by holding the upper end shut by the finger, the tube and contained urine may be removed from the glass or bottle for observation. The specific gravity is read off as indicated by the bulb floating in the middle of the column. The advantages of the apparatus as to ease and readiness of application are obvious ; its disadvantages depend upon the limit of applicability. Linsley ⁵⁹_{May 10, July 26} reports a case of high specific gravity in urine free from sugar occurring in a case presumably of typhoid fever. The urine was diminished in quantity, reached a specific gravity of 1050, showed diminished proportion—or, at least, not increased proportion—of urea, but a greatly increased amount of phosphates. Citron ¹¹⁶_{Sept.} has determined the following formula as expressing the relation between the albumen content of pathological fluids, as ascites, and the specific gravity: $A \text{ (albumen)} = \frac{2}{3} (\text{sp. gr.} - 1000) - 2.8$. This is, of course, inapplicable to the urine, except after careful exclusion of other elements contributing

to the increase of specific gravity, and in practice in this direction is without value.

Reaction.—From a urological point of view, Gautrelet²⁴_{Dec. 3, 18, 22, '99} divides the various pathological conditions into those characterized by hypoacidity of the juices and secretions and those marked by hyperacidity. In the former class he recognizes a condition of temporary diminution of the urinary acidity arising from various circumstances, to which he applies the term *hyperacidité paradoxale*, and which is due to variations in the excretion of phosphoric acid. Damour⁷²_{Nov. 1} refers a case of *ardor urinal*, with intense acidity of the excretion, to the excessive use of rancid butter; diet and a mild alkaline medication rectified the condition promptly.

ALBUMINURIA.

That the tendency for the blind acceptance of the terms “functional” and “physiological” albuminuria is diminished in its force there can be but little doubt, from examination of the bulk of literature. At any rate, the general view of the profession seems established that but a very small proportion of cases of albuminuria may be denominated by these terms, although there is recognition of the fact that a relatively large number of instances where albumen exists in the urine are not to be looked upon as instances of nephritic etiology. When Pavy called attention to the existence of a “cyclical” variety of albuminuria, non-dependent upon renal inflammatory cause, there occurred in the literature of the symptom a large number of citations of cases which possessed but a single claim to be grouped together,—their intermittent manifestation. That in previous years there was too great a disregard of any causes of albuminuria other than Bright’s disease of the kidneys cannot be denied; but, in the haste to explain those numerous cases whose course failed to coincide with a prognosis of renal inflammatory affections, the opposite error had been committed of neglecting to appreciate their full significance in assuming their “physiological” character. Perhaps Goodhart²_{May 17, 90, Feb. 18} has expressed the clearest view of the subject when he states that the terms “functional” and “physiological” have little warrant when applied to albuminuria, and ought to be discarded, but that “intermittent” might well be retained; for, although intermittency is by no means wholly absent in cases of pronounced nephritis, it

may serve to distinguish a group of cases about which it may still be said that some uncertainty exists.

In Goodhart's experience during the last ten years there have been recorded 272 cases of albuminuria, of which number 39 belong to the class which has come, within the past few years, to be known as functional. Of these cases 26 were males, 13 females,—a disproportion possibly of suggestive import as to the origin of the phenomenon. Of these cases 2 were associated with oxaluria,—a condition which may mechanically possibly produce an albuminuria; in 2 the albumen, which was precipitated by cold nitric acid, was accompanied by crystals of nitrate of urea, indicating a condition allied to lithæmia and to a class of albuminurias which, in relation to the kidney, may be denominated as congestive; 1 case was preceded by a hæmoglobinuria, and the writer suggests the modification of this in the intermitting albuminuria which followed; 8 cases belong to a group due to passing ailments of the passages, the presence of a leucorrhœa in women, of seminal discharge or mucus or blood in male cases; 17 cases are included in a group which Goodhart regards as neurotic. He does not clearly define the etiological position of these cases, which are classed together only because of their common occurrence in persons of neurotic tendency; but indicates that it includes such cases as are associated with oxaluria (in the neurotic), cases of albuminuria from the passages (as from the spermatorrhœa of the nervous), cases in which may be supposed some visceral flux, comparable to that noted so often about the head and neck of neurasthenic women. In this last group it may be assumed that causes which could determine such sudden perspirations as are seen in neurotics at times should have some effect toward producing a vascular strain upon the viscera as well; and Goodhart would include in this group the cases to which Johnson has called attention, where the symptom is produced by sudden and violent exertion and by cold bathing. Coley, ², in connection with the lectures of Goodhart, calls attention to a case of a young man, apparently in good, florid health, well-developed muscular system, an enthusiastic foot-ball player, in whose urine there was constantly observed a large proportion of albumen. During the period of observation, the first consultation having been in relation to a proposed life-assurance, the patient continued in apparently excellent health, was married in the mean-

time, and attended to his usual business. The writer calls attention to another case of albuminuria, which is, however, in all probability, a nephritic case, terminating fatally, but without any appearance of œdema during the course of illness. Washburn,⁹ while, from experiments with delicate reagents upon the urine of fifty apparently normal individuals, confirming the view of Posner as to the existence of minute amounts of serum albumen in normal urine, does not accept albuminurias of readily distinguishable amount as functional. Out of 338 persons examined by this writer in relation to their fitness as candidates for life-insurance, 20 (5.91 per cent.) were found to be albuminurics; all these applicants were apparently healthy. In a general way, from those cases which could be observed for a length of time after the primary examination, the majority gave evidence at one or other time of real pathological cause for the symptom.

Davis⁹ places on record a case of a man, aged 30 years, of neurotic temperament, in whom, as the result of examination of the urine for life-insurance, albumen was first found in the urine. Further examination showed a regular period of albuminuria daily for a short period after midday, the urine of all other times being quite free; examination at intervals of the urine of different parts of the day and night, for several years, confirmed this first result. The man was in good health, and careful dietary observation failed to have any influence upon the phenomenon. Huebner,¹⁸ accepting Pavy's cyclical variety of albuminuria, has collected 56 cases: 22 children below 15 years of age, 21 between 16 and 20 years of age, 10 between 21 and 30 years, and only 3 over 30 years old. Among the cases of his own observation there were, however, cases in which there was, at least, distinct evidence of previous disease of the kidneys. He mentions, however, an interesting record of the affection in three sisters—children—in whom there was no history of prior illness affecting the kidneys, but whose uncle had died from Bright's disease. Huebner concludes that cyclical albuminuria is a distinct and peculiar form of chronic albuminuria, not dependent upon disease of the renal tissue, but marking a definite period of change in the organism; it is called forth by a change from the recumbent to the upright position, lasts a variable period of time, and usually disappears the same day. He regards it as due to a general condition of relaxa-

tion of the individual, but is unable to more distinctly explain its appearance. Its prognosis is good, providing the patient takes the proper care of his general health. In the discussion of this paper upon cyclical albuminuria, Schmidt and Heymann each mentioned similar cases; Curschmann expressed himself as exceedingly dubious as to the existence of either a true physiological or true cyclical (regarding the terms as really of similar import in one sense) variety of albuminuria; he believes there is a distinct pathological event in albuminuria, and in its intermittent or cyclical form there is a clear recurrence of a cause of pathological importance. Long¹⁰⁰² submits the case of a woman of 28 years, in good health, except for a marked neurotic tendency, whom he had observed for more than three years, and of whose urine careful and systematic observations had been made at all hours. There was found, although not uniformly, generally a marked albuminuria in the morning during the first hour of activity, which gradually diminished during the day, and disappeared, as a rule, when the patient was in a recumbent position for a time. Dietary influence could be excluded. Long urges, in the study of these cases, many of whom, in his experience, are nervous in temperament, that the influence of the nervous system upon the renal function, either direct or by altering arterial pressure, should be kept in view. Mason² has examined the urine of a man, aged 38 years, whose urine, some time before the writer's series of observations, had been examined several times without result. The patient was in good health; had had scarlet fever in infancy, without the history of nephritis; rheumatism at 16 years of age, without heart disease; typhoid fever two years later; never any venereal affection. Albuminuria was in general most marked during the hours of activity, after the morning meal until in the evening, when it gradually diminished, and was generally absent during the night. By a process of exclusion, Mason concluded that the influence of the cold morning bath was a potent factor in this instance, that digestion was of less force, and that the erect posture alone had little or no power. Active exercise, however, tended to increase the symptom. In the same paper the author gives, as the result of examination of a number of specimens, that the presence of urethral secretions and seminal fluid constitutes no vitiation of the examination for albumen unless the picric-acid test alone be used.

He further states that he has frequently found albumen in the urine of persons, apparently healthy, in variable amounts, particularly after active exercise, and would not look upon it as of any serious import unassociated with other evidences of nephritis, although he does not accept a condition of real physiological albuminuria.

Lee⁶ details 3 cases of albuminuria unassociated with kidney disease, 1 due to a traumatic intussusception of the right ureter with resulting inflammation, the other 2 both in syphilitic subjects, and both readily recovering under proper medication. The last 2 had no evidences of renal disease beyond the transient albuminuria. Bertrand²¹² deals with the same class of cases as those which the English writers have included in the physiological form with intermittence in his "intermittent non-cyclical" variety. He calls attention to the neurotic element present in these cases to the influence which is exerted by diet, exercise, and the change from the recumbent to the erect posture. These instances to which he refers are, too, included between the ages of 15 and 25 years, as a rule,—a circumstance upon which Moxon, in his classification of some years since, laid stress. Séjournet⁵⁷⁷ calls attention to a class of albuminurias in children differing from the scarlatinal form usually observed in children, and due to fault of diet, in his opinion. He states that this form occurs with more frequency than would be supposed, that it evinces to some degree an infectious nature, and that it is caused by the congestion of the kidneys produced by the excretion through them of deleterious matters absorbed from the intestines, the result of abnormal fermentations there.

In an article upon the characteristics of the urine in children in various diseases, Binet¹⁹⁷ states that in 27 cases of pneumonia and broncho-pneumonia albumen has been present in every case in quantities of at least slight degree. In the various infectious fevers he believes that where it is not found the failure simply means that the examination was not complete, or was not performed at the proper period. Where there is manifest renal lesion in these cases, it, in the great majority of instances, is the result of an acute febrile attack, the chronic forms of Bright's disease in childhood being relatively rare. The form of albumen in these cases is that derived from the serum of the blood; that is to say, it is a mixture of serine and serum-globulin.

In an article¹²⁹_{Feb.} upon the albuminuric diathesis in women the writer recognizes the potency of pregnancy in the production of albuminæmia as a condition tending to the production of albuminous urine. The faults in diet include not only the articles of food, but also the excessive use of drinks, as tea or coffee, which tend, in the writer's opinion, to the production of a hydræmia, which, by its further action upon tissue change and upon circumstances of blood-pressure, may influence the manifestation of the phenomenon in question.

Beugnies-Corbeau¹⁵⁴_{Mar. 1} calls attention to the relatively smaller significance of albuminuria in the female sex, the frequent admixture of leucorrhœal fluid and the products of the common vesical catarrhs in this sex materially vitiating the exactness of the examination, unless these sources of error be kept in mind and carefully eliminated in the interpretation of the result. In this connection, too, may be mentioned the notably less grave prognosis of the albuminuria of pregnancy than those of true renal inflammatory disease; in a report of 5 such cases by Lewars²⁸⁵_{Nov. 15} quite large amounts of albumen are recorded, with recovery of the patients and disappearance of the symptom after active treatment.

Guyon²⁶⁶_{Dec. 78} found, in a recent case of albuminuria of intermitting occurrence, that the condition was due to the presence of a vesical calculus. He states that in his experience calculi of the bladder are accompanied by albuminuria continuously when there is a cystitis; but that when the vesical mucous membrane is not affected the albuminuria is intermittent, corresponding with the movements of the patient. Ziffer⁵⁷_{Nov. 35, Dec. 1, 78} calls attention to the intermitting albuminuria which in traces marks the beginning of cardiac complications in emphysema of the lungs, detailing 2 cases upon which his paper is based.

As a symptom, then, albuminuria is to be distinctly held in mind as significant not only of renal inflammatory disease, but as well of inflammatory conditions, transient or chronic, of other portions of the passages; of hæmic fault, as seen in the slight and grave infections and other blood diseases; of variations of the vascular apparatus and the parts of the economy governing it; of faults of digestion and of alimentary excretion; in short, it is to be expected, varying in amount and in the special forms of albumen, perhaps, in the various faults of nutrition, circluation, and excre-

tion. Its prognosis is not to be regarded as absolute, but depends entirely upon the degree and character of the disturbance from which it arises. Lang,⁸ Jan. 12, 19 in an extensive article upon this point, makes these statements: The blood-vessels of the kidneys, as, too, the renal tubules, are not pervious for albumen (serum-albumen and globulin), the molecular volume of which is much greater than that of other urinary excretions, under ordinary conditions (not of the kidneys alone). For anatomical reasons the pressure in the renal tufts is much greater than in any of the rest of the renal circulation. Diminution of this pressure in the arterial side of the renal circulation by actual hydraulic pressure tends to produce marked overloading of the capillary tufts, which, gradually overpowering the vessel-walls, eventually opens pores in them through which albumen is permitted to escape. An increased pressure in the arterial side by rapid escape of the blood through the venous side of the renal circulation is not sufficient to produce this effect. A diminished blood removal from the kidneys will, however, by producing a passive congestion of the capillaries, permit the establishment of the phenomenon in question. General venous stasis of the kidneys allows the occurrence of albuminous excretion and the production of an associated hæmaturia. Occlusion of the ureters, partial or complete, tends to act in the same manner, and by the production of a passive congestion. All albuminurias following diminished arterial pressure, and those where, from any reason, the resistive power of the capillary walls is lost or diminished, may be explained upon such mechanical basis. The writer does not endeavor to explain the mechanism of those albuminurias in which there appears to exist chemical change of the blood constituents, although the variations must be acknowledged to probably produce changes in the readiness of flow of the blood through its channels and, hence, in the pressure.

Lecorché and Talamon²⁰² May 10 regard these alterations of blood-pressure as probably often the primary pathological condition in the production of this symptom, but insist that the direct mechanism depends upon another and secondary factor,—alteration of the secretory epithelium consecutive upon an insufficient afflux of blood-pabulum. A similar position is assumed by Senator,¹¹⁴⁹ who recognizes also the hæmatogenous form of Semmola.

Patton, Douglas, and Mackenzie² July 26; ¹ Aug. 20; ⁴¹ Nov. 10 publish the results

of numerous observations upon the forms of albumen found in the different varieties of albuminuria, nephritic and otherwise. They regard Senator as right in maintaining the presence of both serum-albumen and globulin in all cases of albuminuria, although these two proteids vary much in their proportionate presence. They are not able to confirm the view that amyloid disease of the kidney may be distinguished by the high proportion of serum-albumen, and do not agree with Maguire that functional albuminurias are characterized by the excessive presence of serum-globulin. These proteids vary in their proportionate amount in the course of the day, globulin being highest at night and reaching its lowest point after breakfast. High arterial tension seems to favor the transudation of serum-albumen; while the opposite condition favors the escape of serum-globulin. The physical characteristics of albuminous urine are described by Picard.²⁴_{Sept. 11} There is apt to be a slight froth on the surface, persisting some time after the specimen has been shaken; the color may be normal, but is apt to be high, somewhat reddish, and clouded at the beginning of the attack. The quantity is at first diminished, but later may be slightly increased above the normal. The specific gravity varies with the quantity and color; it is usually increased in the beginning of the attack. The amount of albumen contained is rarely over 4 or 5 grains (1 to 1½ drachms) to the litre.

TESTS FOR ALBUMEN IN THE URINE.

Trichloroacetic-Acid Test.—Boymond³_{Jan. 11} states that he is able with this substance (the method of employment stated in the last edition of the ANNUAL) to obtain an albumen reaction where there is but a minute amount of the substance present, and where heat has already caused a separation of the ordinary albumens, or where sulphate of magnesium has been employed for separation of the globulin. The same test is recommended by Granville⁶_{Jan. 11} for its delicacy, and because it is not apt to coagulate any mucin which may be present, or throw down the peptones. Flexner²²⁴_{Mar. 29} and Reese⁷⁶⁴_{Feb.} also confirm Boymond as to the delicacy of the test. The latter states that, in 14 cases where this reagent gave a positive result after failure of nitric acid and heat and acetic acid, there were discovered casts in the urine.

Zouchlos' Tests.—Zouchlos²⁸³_{Nov.} proposes as a qualitative test a

reagent composed of 1 part of acetic acid and 6 parts of a 1-per-cent. solution of bichloride of mercury. If to a few drops of this solution a small amount of an albuminous urine be added, a turbidity results.

Zouchlos also presents two other solutions for the determination of albumen in urine. The first of these is composed of 100 cubic centimetres ($3\frac{3}{4}$ ounces) of 10-per-cent. solution of rhodanide of potassium and 20 cubic centimetres ($5\frac{3}{4}$ ounces) of acetic acid. The other is a mixture of equal parts of rhodanide of potassium and succinic acid in powder. The first of these three tests is recommended because peptone fails to produce any cloudiness in contact with the reagent, and because neither uric acid, urea, phosphates, or sugar give response. The second solution is regarded by the writer as more exact. When albumen is present, even in small quantities, an immediate turbidity results when the urine is brought into contact with a small amount of the reagent; and where is a large amount in the urine, a thick, white precipitate is thrown down. An excess of the fluid does no harm. For convenience the third reagent is recommended. The substance is in powder, and a small quantity added to the urine, when, if albumen be present, even in but small amount, a turbidity results. Schick, ⁸⁸_{v. 15, No. 24} after careful investigation, confirms the accuracy of the second and third of these tests, but does not find them in any way superior to the older methods of albumen determination.

Nitric-Acid and Potassium-Ferrocyanide and Citric-Acid Tests.—Goodhart ²_{May 17} states that after investigation for several years in relation to the relative value of nitric acid, picric acid, and ferrocyanide of potassium and citric acid, he has discarded the picric acid because of the frequency of mistake during the administration of quinine. Of the other two, in only 1 case out of many did the nitric acid fail to give a characteristic reaction when the ferrocyanide and citric acid succeeded, and, in the long run, he states that the nitric acid produced a more decided reaction than the other. Jolles ¹¹⁸_{May 25} accepts the potassium-ferrocyanide and citric-acid test as the safest and most delicate of the ordinary qualitative tests, its limit being 0.0008 gramme ($\frac{2}{500}$ grain) in 100 cubic centimetres ($3\frac{3}{4}$ ounces) urine.

Quantitative Tests.—Geisler, ⁴_{Dec. 22, '96} in an article upon the later quantitative methods for estimation of albumen in the urine, states

that Esbach's method is well suited for clinical purposes, because of the simplicity of the procedure, and because it is generally sufficiently delicate for ordinary work. If the amount of albumen exceed 0.7 per cent., in order to obtain more exact results, the estimation is to be made with urine diluted in known proportions.

Christensen's method is not as exact as Esbach's, but will answer for approximate results. It becomes more exact the less the amount of albumen may be, and for this reason the results may be brought to a greater degree of accuracy by diluting the urine. One great advantage Christensen's method has over Esbach's is the saving of time, the entire procedure being quite possible within the limits of ten minutes, while for proper estimation by Esbach's apparatus at least twenty-four hours are required.

Heat Test.—Kirk, ⁶_{Apr. 28, May 2} refers to an article of Auld's, ⁶_{p. 1021, '96} in which it was stated that a boiling temperature was necessary in order to bring out the full value of the picric-acid test. Auld had noted the fact that heat often developed a slight turbidity in urine to which an equal volume of a saturated solution of picric acid had been added, when no clouding could be produced by the cold reagent. Kirk states that this turbidity is, however, due to the precipitation of mucin, and that heat with acetic acid behaves in much the same manner, detailing a number of experiments corroborating his position. He states that normal urine, giving no result with the ordinary tests, will, with heat and an amount of acetic acid distinctly less than the $\frac{1}{10}$ volume usually employed for acidulation, show a decided turbidity on account of the precipitation of mucin. He finds another serious objection to the heat test in that not infrequently not sufficient acidulation is made to prevent the precipitation of phosphates in the method prescribed. He calls attention to the error of regarding the upper zone of turbidity, so often obtained in the nitric-acid test with albuminous urine, as due to urates, and confirms the suggestion of Roberts that this is rather the result of mucin precipitation. The writer regards the presence of mucin in any large amount as indicative, however, of a pathological cause, and suggests that it is the result not only of change in the lining cells of the bladder, as it is generally supposed, but as well of the cells lining the higher portions of the urinary tract. In other words, it may, perhaps, be sometimes an indication of renal irritation, which later will manifest itself as a distinct lesion ;

and its presence with albumen is not invariably to be looked upon as vitiating the indication of the albumen reaction.

PEPTONURIA, ETC.

An article of considerable importance is published by Boulengier, Denayer, and Devos,⁸⁴⁸ based upon experimental study of peptonæmia and peptonuria. These writers, with Hermann and Henninger, consider the peptones as products of hydration of the albuminoids. Contrary to the generally accepted views, they state that peptone injected into the blood-circulation is not assimilated, but eliminated through the kidneys as peptonuria; but that which is derived from the intestines is in great degree assimilated. They conclude, therefore, that in the passage of the substance through the mucous membrane of the intestines there occurs a transformation of the peptone into albumen. They recognize a normal condition of peptonæmia, which does not, however, lead to peptonuria, as does the peptonæmia due to the injection of peptone into the circulation. In this physiological variety the substance found in the blood is not identical with ordinary peptone, but an intermediate product which they designate as isopeptone. This isopeptone, extracted from the blood, isolated, and injected into the circulation of a second animal, does not produce a peptonuria, and the authors therefore look upon it as an assimilable variety, holding much the same relation to peptone as does serine to egg-albumen.

According to Hofmeister, the transformation of peptones into an assimilable form of albumen is accomplished by the leucocytes and the adenoid elements of the intestines—a hypothesis which is not fairly corroborated by their researches nor yet disproved. The conclusions reached from their investigations are briefly as follow: Peptone introduced into the economy, even in small doses (0.007 per cent.), by any other manner than through the gastro-intestinal mucous membrane, is not assimilable, and is eliminated chiefly as a peptonuria. Intra-venous injections of peptone for therapeutic measures, contrary to the opinions of Mundé and Fowler, are irrational and useless, not to speak of the danger to which such procedure is exposed. Peptonuria follows rapidly upon such injections and lasts a variable period,—one, two, or three days,—according to the dose administered. In a normal individual even large amounts, when given by the gastro-intestinal canal, do not

produce peptonuria. In normal peptonæmia, the peptone, having gone through the gastro-intestinal mucous membrane, is present in the blood in a state of somewhat advanced elaboration, by which it has become assimilable and is able to escape elimination by the kidneys. Peptones injected into the serous cavities are eliminated by the urine, just as much as if the injection were intra-venous. Pure peptone is not of toxic power, the apparent poisonous character described by Bouchard being probably due to micro-organismal contamination; the noxious effects of large doses vary considerably with the nature and variety of peptone, that of egg-albumen being more hurtful than that of ordinary albumen of food-stuffs. Binet¹⁹⁷_{Sept. 20} gives the following analysis of results of examinations for peptone in the urine of 248 infant patients. Peptone was recognized in 34 of these cases. In 28 cases of pneumonia and broncho-pneumonia peptonuria was present in 5; in 6 serous pleurisies the condition failed; 1 of 2 purulent pleurisies was a peptonuric; of 34 cases of measles, none; of 43 scarlet-fever cases, none; of 5 erysipelas cases, none; of severe roseola, the single instance of the symptom was the only case; of 37 cases of diphtheria, 10 showed the presence of peptone; of 21 suppurative cases, 3 (1 an abscess in the iliac fossa, 1 a case of empyema, and the third a case of suppurative coxalgia) succeeded; of 5 typhoid-fever cases, none; of 10 cases of pulmonary tuberculosis, none; of 6 cases of tubercular meningitis, none; of 6 of pertussis, none; of 6 cases of rachitis, 1; of a number of cases (made up of 1 of tetanus, 1 of mercurialism, 2 of false croup, 2 of chlorosis, 1 fracture, 1 burn, 1 of bronchitis with asthma, 1 of perityphlitis, 1 of mitral insufficiency, 3 of scrofula, 1 of mumps), none showed the presence of peptone in the urine.

Of 23 cases of nephritis, however, 13 were peptonuric, as follows: 1 peptonuria out of 5 cases of acute scarlatinal nephritis; 2 out of 4 cases of acute diphtheritic nephritis; 6 out of 8 acute primary cases; 2 out of 2 cases of chronic parenchymatous nephritis; 2 out of 4 cases of chronic degenerative nephritis. Of the above 34 cases of peptonuria, albuminuria was present in all except in 2—1 a case of pneumonia, the other of purulent pleurisy. From these observations peptonuria would appear to occur most frequently among children, in case of diphtheria and acute and chronic nephritis; in most cases the degree is very slight. The

author does not regard the symptom of much value as a diagnostic or prognostic factor.

Propeptonuria.—Heller⁴_{Dec. 1, '00} contributes the records of 3 cases of scarlet fever to the literature of the subject. From these cases he would conclude that the symptom is apt to occur in scarlet fever, not only in case of albuminuria and distinct nephritic complication, but even where no evidence of renal disease is apparent. As a prognostic feature in case of scarlet fever, propeptonuria is not to be looked upon as unfavorable, often appearing toward the close of an albuminuria, and, at times, being present without albuminuria occurring at all in the course of the case. Heller employs, for the recognition of the propeptone, the nitric-acid and acetic-acid and sodium-chloride reaction.

HÆMATURIA.

A general review of the literature of hæmaturia, caused by the *bilharzia hæmatobia*, is given by Chaker.⁵⁰_{Jan. '00} He mentions several cases which present no especially new features, however. A writer⁶_{Jan. '00} calls attention to a hæmaturia occurring in a lad three times, each occasion being clearly connected with the ingestion of the ordinary garden-rhubarb or pie-plant. It is said that the rhubarb is responsible for the hæmaturia because of the laceration of the tubules by the numerous sharp-pointed crystals of oxalate of lime, these being formed in excessive quantity by the combination of the oxalic acid of the plant and the calcium in hard drinking-water. Bernays⁷⁸⁸_{July} describes a case of hæmaturia in Schede's clinic in Hamburg. A boy had hæmorrhages from the urethra for ten days, and, thinking the origin to be in the bladder, Schede performed a supra-pubic operation, but found nothing. The operator then introduced by means of this opening a catheter into the right ureter and the distal end into the urethra. An instrument introduced into the penile urethra grasped the catheter and drew it out at the meatus. By this procedure the origin of the hæmaturia was determined to be in the right kidney, and, this organ, being found in a degenerated condition upon exploration, was removed. Unfortunately, the further course of the case and the exact condition of the kidney are not recorded. Brown²⁴⁵_{July} records a case in a married woman aged 26 years, III-para, who had been in good health previously, and who came from a gouty family. There were

three attacks of hæmaturia, the first in March, 1888, the second in August, 1888, and a third in October, 1889. In the last attack, a diagnosis of renal calculus having been made, an incision was made for exploration. No calculus was found, but in order to control the hæmorrhage nephrectomy was performed, and recovery eventually took place. Histological examination of the entire specimen by Delafield showed only chronic pyelitis, which he suggested as possibly due to the previous presence of a calculus which may have been passed with the earlier clots. The following case, which in its onset presents symptoms reminding one of those accompanying the ordinary paroxysmal form, is presented by Pope.⁶ A man aged 24 years, moderately well nourished, was suddenly seized, in October, 1886, by a sense of weakness and fatigue, chilliness, loss of appetite, severe burning pain in the soles of the feet, cramp in the toes, and twitchings of the muscles of the limbs. The night of the same day the urine was deeply colored. There was no swelling of the feet, no pain in the lumbar region, no feverishness, and no evidence of an acute nephritic attack. The bowels were markedly constipated. With but slight effect upon his general health, he finally drifted into the writer's hands in March, 1889. At this time he had the appearance of health, and in spite of the continuous loss of blood by the urine for over two years presented no appreciable anæmic symptoms. He complained of slight but ever-present fatigue, anorexia, and persistent constipation. The urine was about normal in amount, but uniformly bloody in appearance, and under the microscope appeared as one mass of well-preserved, distinctly defined red blood-cells, with here and there leucocytes. Hæmatin crystals were looked for, but were absent. Having learned the fact that in the summer the symptom was usually somewhat better, and coupling with this the occurrence of decided ill effect of the administration of ergot, Pope came to the conclusion that the symptom was due to some alteration of pressure in the renal capillary circulation, probably an increase. With this view of the etiology the constipation was overcome and the patient ordered vapor baths every few days, both measures tending to diminish the capillary pressure. Under this treatment the patient rapidly improved, and in several months was apparently entirely cured. In a discussion upon the symptom in question before the Richmond Academy of Medicine, Parker⁸¹ mentions an accident which occurred

to himself fifteen years ago. In jumping from an overturned buggy the wheel struck him in the back. Three days later he discharged through a catheter, which he was compelled to use, nearly a quart of coagulated blood. The hæmorrhage continued for three or four days, and gradually subsided entirely. Oliver,² has met the following case, which presents remarkable features: A woman, a widow who had never been pregnant, aged 63 years, began to menstruate when she was 11 years old and performed that function normally until the 51st year of her age, when she ceased. For eight years after the menopause she was in excellent health. When 59 years old she noted that every four weeks the urine became deeply tinged with blood, this discoloration lasting for eight or ten days, when the urine again became normal in appearance. For several days before the periods of hæmaturia the patient complained of aching pains in the front of both thighs and a feeling of distension in the abdomen. Between the hæmorrhagic attacks there was not and is not any trouble with the urine, neither is there any pain; but during the hæmaturic period there is a less frequent desire to micturate than normally. Microscopic examination of the urine showed the presence of numerous red blood-cells. There has not been any loss of flesh or vigor, and nothing beyond the periodic hæmaturia to suggest disease. In the treatment of a case of hæmaturia caused by rupture of varicose veins of the bladder in an old man, Huzza²⁷¹ reports excellent results from the use of the tincture of *carduus marianus*. This case was one of an old man aged 60, who awoke suddenly from a lascivious dream and felt a desire to urinate; the urine which was voided was deeply tinged with blood, and thereafter the condition of hæmaturia persisted for six months, until the medicament was administered in $\frac{1}{2}$ -drachm (2 grammes) doses thrice daily, when it rapidly subsided. Toby¹⁸⁶ mentions a case of severe vesical catarrh, in which hæmaturia entered as a complication. The blood and mucus forming masses of clotted material in the viscus, the patient was unable to void the urine, and catheterism failed until the writer applied to the distal end of the catheter the reversed bulb of an ordinary bulb-syringe. The suction thus produced easily induced the passage of the masses of clot, and thereafter little difficulty was experienced. The various articles upon malarial hæmaturia are considered in the following sections.

HÆMOGLOBINURIA.

Delabrosse ²¹²_{Dec. 70} divides the symptom into two forms,—idiopathic and toxic. In the former class he arranges four groups: paroxysmal, periodic, that preceding nephritis, and that following nephritis. The scope of the paper is limited to the idiopathic form, the causes of which are not well understood. Paludism and syphilis are, however, recognized as predisposing causes, although their exact rôle is not determined. In occasional instances the etiological factor of cold is accepted. In connection with this paper it may be pardonable to recall the division of hæmoglobinuria mentioned in previous editions of the ANNUAL into that arising from hæmic fault, from hæmic cythæmalysis, and that arising within the renal system, from urinary cythæmalysis. In relation to the latter classification, the toxic form of Delabrosse would include only those hæmoglobinurias which are induced by the action of previously-formed toxic substances introduced into the system, the hæmoglobinurias of disease toxæmias falling in with the idiopathic variety. A disadvantage, too, if it may be so considered, exists in the occasional cases of hæmoglobinuria, with or without hæmaturia, occurring as the result of the separation by the kidneys of toxicants irritant to the renal structure.

In completion of his previous work, which indicated an infectious nature of the hæmoglobinuria in Roumanian cattle, Babes ³_{May 7}, has succeeded in producing the condition in animals by inoculation with cultures from the blood of hæmoglobinuric animals or with fluid obtained from the renal tissues of an animal suffering from the disease. Inoculation in cattle was made into the veins or into the deep connective tissues; within a few days the symptom developed, lasted about six or eight days, and was followed by recovery or death. This final link in the chain of evidence being established, the infectious nature of at least one variety of the condition may be accepted. Charon ¹⁰⁰_{May 10} ¹⁷_{Sept. 22} recognizes these three principal forms: paroxysmal hæmoglobinuria, hæmoglobinuria secondary to a number of diseases, and toxic hæmoglobinuria. In the first of these varieties he mentions as causal factors the action of cold, violent muscular exercise, heredity; and among the predisposing causes syphilis and malaria. The condition is of more frequent occurrence in the male than in the female, and occurs with greater frequency in middle life. Saundby

has seen 2 cases which seemed to present some hereditary features. The secondary form of the condition occurs in connection with Bright's disease of the kidneys, rheumatism, and trauma; the toxic variety depends upon the action of numerous substances introduced into the system upon the red blood-cells, such as sulphuric, hydrochloric, phenic acids, sulphuretted hydrogen, phosphorus, naphthol, tobylene diamine, pyrogallie acid, aniline, sulphate of quinine, etc., and, too, the action of toxic disease agents, as in the infectious diseases. The writer mentions, as endeavoring to explain the appearance of the malady, the theory of von Rossem, according to whom the hæmoglobinuria is really a hæmaturia in which the globules have been disorganized in the urine on account of the presence of an excessive quantity of oxalates.

This idea is taken up by Foulerton², independently of von Rossem, who, having noted the association of these symptoms in a number of cases, and the fact that both may be referred for explanation to such a general state as Raynaud's disease, suggests, as the course of events in the production of hæmoglobinuria, (a) a disturbance of the vasomotor and katabolic nerves of such nature that the normal processes of katabolism are interfered with; (b) a consequent retardation of the processes of metabolism with an accumulation of one or several intermediate waste-products,—among them uric and oxalic acids; (c) an oxalic-acid storm, characterized by a free excretion of oxalate of lime, together with specific constituents of the blood, this excretion of blood constituents being a direct effect of the action of the oxalic acid or its lime salt. Charon does not accept this hæmolytic action of oxalic acid or its calcium salt for various reasons, especially as the addition of oxalate of lime to bloody urine does not appear experimentally to induce a more rapid solution of the contained red cells than the ordinary urine. The second theory explanatory of paroxysmal hæmoglobinuria is that of a previous hæmoglobinæmia, the urinary condition being the natural excretory event following the hæmic fault. The exact manner of the production of the hæmoglobi-næmia is not clearly known, although a number of theories have been offered. There appears, however, to be an important factor in the action of cold, probably through the nervous system. A third view of the origin of hæmoglobinuria of paroxysmal form is the parasitic theory of Babes, above mentioned, which seems to be

fairly proved in a limited class of cases. A large number of writers look upon the condition as distinctly of renal origin, some viewing the renal circulation as the point of origin, others recognizing distinct structural fault in the kidneys acting in some way to the escape of the blood from the renal capillaries, and their destruction in the renal tissues. Finally, Henocque suggests some developmental fault of the red cells induced by sudden nervous influence. The secondary form of hæmoglobinuria of Charon is probably always renal in its origin, depending upon the slight tissue hæmorrhages from congestion of the kidneys in Bright's disease, in rheumatism, and upon the hæmorrhages of traumatism. The toxic variety is, in the majority of cases, secondary to a toxic hæmoglobinæmia, and renal change is not a necessary concomitant.

These various classifications are, of course, not without their value in the understanding of the symptom under consideration ; but I cannot appreciate the necessity for their existence. The point of departure of the blood constituents from their normal relations to the formation of a hæmoglobinæmia, either general or limited to the renal circulation, constitutes a natural group embracing practically all the toxic and infectious instances and all of that group which are most entitled to the term of paroxysmal hæmoglobinuria. Another group is constituted by those cases in whom, in consequence of no particular fault of the blood, but most frequently of renal disturbances, the hæmoglobinuria is an expression of a hæmaturia with the solution of the blood after its departure from its normal conduits, either in the renal structures or in the urine in the other portions of the urinary tract, and may be termed a renal hæmoglobinuria. It tends to create clinical confusion to recognize as one class all those cases in whom there is any manifestation of a paroxysmal occurrence. For example, the following case detailed by Saunders ⁸⁹_{Sept. 1} presents a history of probable local injury distinct enough to demand a consideration of trauma as an etiological factor of prime importance. Eight years before consulting Saunders the patient had been caught and crushed between a wall and wheel of a cart on his left side, the injury having been severe enough to confine him to bed for some weeks. Seven years after, when in apparently fair health, although his recovery had never been so complete as to permit the resumption of severe labor, he began to lose color

and strength, and noted that his urine was at times dark and again light and normal in appearance. This continued at intervals for over six years, and eventually the patient died exhausted. On post-mortem examination the spleen was found normal in appearance, but rather smaller than usual; this would in a great measure exclude hæmic disease, although, of course, not absolutely. The right kidney was normal, but the left organ was at least twice the natural size, the pelvis filled with soft fat that nearly obliterated its cavity; nearly the whole of the medullary and the greater part of the cortical portions were infiltrated with fat, by which the characteristic structure seemed to be destroyed, a few small patches only retaining the normal appearance. Unfortunately, further examination of the specimen was impossible. I would not interpret this case in exactly the same manner as the writer, who refers the hæmoglobinuria to the diseased left kidney. Accepting the absence of splenic change, in the absence of symptoms of more than a simple anæmia, as evidence of the non-hæmatogenous position of blood destruction, it seems not at all unlikely that the apparently unaltered right kidney, which was evidently performing the bulk of renal excretory function, became periodically the seat of vascular insufficiencies for one of several possible reasons, and the hæmoglobinuria developed as the result of changes in parenchymatous hæmorrhages into that organ. Confirmatory of this is the statement that, preceding the appearance of the altered urine, there was invariably noted a sensation of weight in the right loin.

One of the most important communications upon the subject of paroxysmal hæmoglobinuria is presented by Copeman,¹⁵ as the results of experimentation upon several cases of the condition. The most important etiological factor, from the point of view of an exciting cause, is the action of cold upon the red blood-corpuscles. As a result the first and most obvious phenomena of the disease consist in an enormous and rapid destruction of the red cells. The removal of the pigment from the corpuscles did not usually affect the urine for some time, varying from one-half to three hours after the commencement of the exposure to cold precipitating the paroxysm. With the pigment a proteid was present, which was found to be composed mainly of globulin. The pigment, as it is excreted freshly by the kidneys, is oxyhæmoglobin; but if this substance be allowed to remain for some hours in the bladder in

contact with the acid urine it may become converted into acid hæmatin, going through an intermediate stage of methæmoglobin. From these experiments it seems that when the destruction of red cells is not very great the hæmoglobin does not appear in the urine, which is apt, however, under these circumstances, to contain amounts of albumen. Copeman likens the condition to paroxysmal albuminuria, and states that it is very probably an exaggeration of a normal process. The red cells are constantly being destroyed, but in such small amounts that the hæmoglobin and albuminous matters do not appear in the urine as hæmoglobinuria or albuminuria; when, however, this destructive change becomes marked the products of disintegration are in too great amount to be used up, and hence are gotten rid of by excretion through the kidneys. Why in two individuals exposed to the same determining cause, as cold, there should in one develop a paroxysmal hæmoglobinuria and none in the other is not well understood; Copeman admits there must be some peculiarity of the corpuscles themselves rendering them unduly sensitive to the causative agent. That the peculiarity may be due to syphilis, as maintained by numerous observers, is confirmed by the paper in hand, all of 6 cases detailed having syphilis in one form or other. In order to prove the hæmoglobinæmia preceding the urinary symptom, a patient, ⁶ before experimental exposure to cold, had a blister applied to the lumbar region at such a time that serum commenced to collect just before the initial rigor came on. His bladder was emptied and the urine found to be normal, but serum from the blister was found by the spectroscope to show the presence of oxyhæmoglobin. The urine was subsequently removed from the bladder every quarter of an hour, and it was not until the third attempt that it was found to contain hæmoglobin. The view taken by Copeman, that the failure of the symptom in many persons exposed to the same conditions which are in disposed individuals sufficient to induce hæmoglobinuria is due to the fact that small amounts of free hæmoglobin in the blood-serum are used in the economy and do not require excretion, is in line with the results of experiments of Stadelmann and Gardecke, ²⁷³ ²⁵ who state that of the hæmoglobin free in the blood-serum, by whatever means it has gained presence there, a not inconsiderable part is applied in the formation of new red disks. According to their experiments the liver seizes upon a small pro-

portion (say, one-fiftieth of the amount present) and forms bilirubin therefrom. Out of the whole amount which the system is able to tolerate without hæmoglobin or albumen appearing in the urine, a large remainder is still unaccounted for, and Stadelmann concludes that it is used by the other organs as a nutrient like any other albuminoid substance. Renzi,⁵⁷_{Dec. 16, '99},⁸⁴_{Feb. 4},⁸_{Dec. 12, '99},⁸⁴_{Jan. 18} taking up the opinion of Hayem in his recent work upon the blood, that the hæmoglobinuria is usually an expression of disease of the kidneys, from examinations of the blood from such a case at various periods in relation with the paroxysm, denies Hayem's position and corroborates the general testimony as to this malady, that it is dependent upon a systemic cythæmolysis, the products of which are later excreted largely through the kidneys. Joseph¹¹⁸_{May} reports a case of a boy aged 5 years, in whom, as an effect of chilling, small patches of circumscribed œdema appeared over the surface, accompanied by pain in the abdomen and presently by hæmoglobinuria. There was no specific history, but a maternal cousin aged 8 years was said to present similar phenomena. Joseph raises the question whether the analogues of the livid, elevated dermal patches might not be found on the mucous surfaces, and, especially as accounting for the urinary symptom, involving the tubular surfaces of the kidney. Diamantopulos, corresponding editor, Smyrna, mentions 2 cases of paroxysmal hæmoglobinuria,—one aged 30, the other 40 years,—both of whom had some years previously been infected with syphilis. For the last four years, if exposed to cold, hæmoglobinuria would ensue in these cases, lasting three or four days and disappearing spontaneously when the patients were kept in warm surroundings. Hood⁶_{Oct. 4} details a case of paroxysmal hæmoglobinuria occurring in a boy of 14, with history or evidence of syphilitic or malarial taint. The first attack followed a severe wetting, and there seemed to be present an acute attack of nephritis.

Bertelle²⁴⁸_{Feb.} has met with a case in a young soldier of excellent vigorous constitution, without taint of syphilis, alcoholism, or malaria. The primary attack followed severe exercise, and afterward the influence of cold or of exercise frequently determined the occurrence of paroxysms. Moscato⁵⁰⁵_{Nov. 17, 18, 19},⁸¹_{May 22},¹⁷ has met a number of cases which indicate an influence in the abuse of quinine in the production of hæmoglobinuria, which thus passes as malarial

hæmoglobinuria. These instances occur in malarial cases and appear first during the administration of quinine. The writer's position is sustained in that, repeatedly withdrawing the drug, the urinary symptoms regularly disappeared, only to re-appear on re-administration of quinine. Among American physicians in malarial districts this opinion has a firm hold, and in the literature of the year are numerous expressions. The view is practically unanimous that quinine in large doses, unless preceded by full doses of calomel, is apt to exaggerate the hæmoglobinuria arising from paludism, and that its proper place is not at the onset of the disease, but rather in the later stages, when, by depletive, cathartic, sedative, and diuretic agencies, the febrile stage of the malady has been diminished. Among those who distinctly accuse quinine of inducing, probably by bringing about a congestive state of the kidneys, a more intense degree of the symptom, may be mentioned Barton,⁸⁴⁹ Hamilton,⁸⁵ Stadler,⁸⁵ Davidson,¹⁹⁰ Sievers,¹⁹⁰ and Rothrock.¹⁷⁶ Middleton,⁸⁵ Magruder,⁸⁵ and Watkins,⁸⁵ however, oppose these views and insist upon the necessity for quinine administration in large doses.

GLYCOSURIA.

Becker's Test.—Becker²² ²²⁴ ¹¹⁸ ¹⁴⁷ ²² ³⁴ proposes the following as a ready method for estimating the presence of sugar in urine: Ordinary visiting cards, which contain a certain amount of potassium in their texture, are immersed in a solution of copper sulphate and then dried and carried. Drawing a few lines over a card thus prepared with a match-stick dipped into the suspected urine, and then heating the card over a lamp, if there be sugar present the lines will appear brown, the intensity of color depending upon the proportion of sugar in the specimen. In making the test it is recommended to compare the results with normal urine. The reaction depends upon the driving off of the water of crystallization of the minute copper-sulphate crystals, and then, with the influence of the alkaline paper, the sugar present in the urine reduces the cupric salt.

Phenyl-Hydrazin Test.—Geyer,⁵ ¹¹⁸ in order to explain the possibility of mistake in this test in case of action upon it by glycuronic acid or a salt of this acid in the urine, has carefully studied the relations between phenyl-hydrazin and glycuronic acid to see whether they really form a compound like phenyl-glucosazon.

Glycuronic acid deviated the plane of polarized light to the right—its compounds turn it to the left—and reduced copper on heating in alkaline solutions. The action of the acid, however, differed from that of sugar in that it reduced the copper only after prolonged boiling, and often not until cooling had taken place. Glycuronic acid, or its soda salt, treated with phenyl-hydrazin after the manner of von Jaksch, gave yellow crystals so resembling in appearance and solubility those of phenyl-glucosazon that no difference could be detected. Examining a series of urines in which phenyl-hydrazin had given a positive result, but in which he did not believe sugar to be present, out of 14 cases only 4 responded to the fermentation test, and with the polariscope deviated the light to the right, although he made use of concentrated specimens in these last tests. He concludes that phenyl-hydrazin is not a reliable test for sugar, and can give positive results with normal urine.

Jolles⁵⁷_{Aug. 2, Aug. 20} has examined more than 600 specimens of suspected saccharine urine, with the result that it indicated the presence of sugar in 4 cases in which the other tests showed its absence. He gives, therefore, an opinion that it is not entirely trustworthy, although in conjunction with other tests it is valuable in the detection of small quantities of sugar. He says that, as a limit of delicacy, in a simple solution of sugar in water 0.024 per cent. can be detected.

Hirschl⁵⁸_{Aug. 14, p. 277} looks with more favor upon the test, regarding it as positive in its results. If, after the phenyl-hydrazin has indicated the presence of grape-sugar, there should be a failure of the specimen to turn the light to the right in the polarizing apparatus, or should there be noted a levogyric tendency, this author looks upon it as indicative of the presence of lævulose, or fruit-sugar.

Symonds¹_{July 12} looks upon the limitation of the test from lactose as very slight, and one which may practically be ignored. He has examined a number of specimens of urine with it in relation to such drugs as are excreted through the kidneys, as morphia, atropia, phenacetine, antipyrin, acetanilid, chloral, quinine, and chloroform, without any complications of the method resulting. The presence of chloral is objectionable, because it forms an abundant precipitate of reddish-brown globules, which tend to mask the yellow crystals of phenyl-glucosazon.

Fehling's Test.—Purdy¹_{Mar. 2} acting upon the suggestion of

Schmiedeberg, to substitute mannite for the Rochelle salt in Fehling's solution, in order to give the reagent more permanence, has constructed a formula upon this of Schmiedeberg's by the addition of glycerin, which accomplishes the end even more satisfactorily. In his second paper he discards the mannite entirely, and proposes the following formula for the construction of the cupric-sulphate solution: cupric sulphate, 4.15 grammes (64 grains); caustic potash (pure), 20.4 grammes (315 grains); strong water of ammonia (sp. gr., 0.90), 350 cubic centimetres ($11\frac{1}{2}$ ounces); pure glycerin, 50 cubic centimetres ($1\frac{7}{8}$ ounces); distilled water, to 1 litre (1 quart). The solution is to be prepared by dissolving the copper sulphate in part of the water and adding the glycerin, dissolving the potash in another portion and mixing the two, adding the ammonia and sufficient water to make up to a litre, and filtering. Thus prepared, 30 cubic centimetres (1 fluidounce) of the solution is reduced by $\frac{1}{4}$ grain (0.016 gramme) on boiling. The method is performed as follows: Add 30 cubic centimetres (1 ounce) of the test solution to a similar volume of distilled or soft water in a glass flask, and boil. While gently boiling, add the urine to be tested slowly, drop by drop, from a minim dropper, until the blue color *begins to fade*; then continue dropping, but more slowly, until the color is gone. The number of minims of urine required to reduce the sugar in the 30 cubic centimetres (1 ounce) of test solution contain $\frac{1}{4}$ grain of sugar, from which the percentage content may be calculated. As an approximate test, Purdy applies the method as follows: First dilute the urine with an equal volume of water; measure exactly 1 drachm of the copper solution into a test-tube and heat to boiling; count the number of drops required to discharge the blue color, and read off the approximate content from the table given. One drachm (4 grammes) of the test solution is reduced by—

- 1 minim of diluted urine indicates 30 grains (2 grammes) or more to the ounce.
- 2 minims of diluted urine indicate 15 to 30 grains (1 to 2 grammes) to the ounce.
- 3 minims of diluted urine indicate 10 to 15 grains (0.64 to 1 gramme) to the ounce.
- 4 minims of diluted urine indicate 7.5 to 10 grains (0.50 to 0.64 gramme) to the ounce.
- 5 minims of diluted urine indicate 6 to 7.5 grains (0.38 to 0.50 gramme) to the ounce.
- 6 minims of diluted urine indicate 5 to 6 grains (0.32 to 0.38 gramme) to the ounce.
- 8 minims of diluted urine indicate 4 to 5 grains (0.25 to 0.32 gramme) to the ounce.
- 10 minims of diluted urine indicate 3 to 4 grains (0.19 to 0.25 gramme) to the ounce.
- 15 minims of diluted urine indicate 2 to 3 grains (0.13 to 0.19 gramme) to the ounce.

Aargau²¹⁴_{Apr. 11} recommends the alkaline glycerin-copper solution of Ruossel in place of the copper and tartrate solution of Fehling and Soxhlet, and suggests, as a terminal reaction, that a drop of the copper solution be placed with a glass rod upon a porcelain surface, and a drop added of a solution of boric acid and potassium ferrocyanide, when, if the copper has not been reduced, a red reaction of copper ferrocyanate will at once appear. Roussel recommended that for accuracy the suspected urine be diluted to 1 to 500. Aargau states that for practical purposes a dilution of 1 to 250 is better.

Gerrard⁶_{Jan. 11} suggests that in the application of Fehling's quantitative test, the urine burette, instead of being graduated in cubic centimetres, and the graduation be marked in percentages; in this, of course, the uniformity of dilution of the various urines must be maintained.

Fermentation Test.—With a view of diminishing the complexities in the quantitative estimation of sugar by the fermentation method, Toison²²⁰_{Dec. 6, '76} calls attention to a slightly modified method. The apparatus consists of (a) a test-tube, rather long and narrow and strong; (b) a gum stopper, pierced by two openings; (c) a small, narrow glass tube, curved at both ends in U form, of about the same length as the test-tube, and inserted in one of the holes in the rubber stopper; (d) a second small glass tube, 6 or 8 centimetres long, closed at both extremities, but having an opening in the side about one-third distance from one end. This last tube, which traverses the second opening in the stopper, may be entirely closed by withdrawal of the lateral opening into the stopper, or may be pushed into the test-tube, so as to be in communication with its cavity. For estimating the sugar in the urine, small pieces of caustic potash are put into the small tube (d), which is then filled with water. This is known as the potash-tube; it is then introduced into the stopper in such a manner that the lateral opening is kept closed by the rubber mass of the stopper. Then the double U tube is inserted into the other opening of the stopper. Finally, the test-tube is filled with urine and a small amount of fresh, well-washed yeast is added. It is closed with the stopper provided with the small glass tubes, and left in a vertical position in a temperature of 25° or 30° C. (77° or 86° F.). Care should be taken not to leave any air-space be-

neath the stopper. If there be any sugar in the urine, carbonic-acid gas, due to the alcoholic fermentations caused by the yeast, will appear at the top of the tube and drive out through the double U tube a quantity of urine equal to its own amount. The fermentation ended, the potash-tube is pushed down into the urine-tube until the lateral opening comes in contact with the free CO_2 , when the latter is rapidly absorbed, thus verifying its supposed nature. From the amount of urine forced out through the curved tube, an estimation of the sugar may be made. This method is, according to Toison, to be compared with a similar tube, filled with pure water, as a control experiment, since, if the yeast be not fresh and well washed, it may cause fermentation even in the absence of sugar in the urine. This method is, however, in my opinion, open to fatal objections of loss. Toison has not taken into account the fact of the absorption of a definite amount of carbon-dioxide gas by the urine, and the very palpable loss when the volume of gas forces a body of urine into the curved tube and out of the limit of the apparatus. This objection is brought out against Einhorn's fermentation-tube by Guttman, ⁶⁹ by whom a series of tests, with known amounts of sugar, were made. When sugar is present in urine beyond 1 per cent., this method is very faulty, and even when the sugar is in small amount there is to be taken into account a small degree of loss.

Polarizing Saccharimetry.—A specimen of urine was shown by Carles ⁷⁰ Dec. 22, '90 which, although it readily reduced Fehling's solution, had no effect on polarized light. He calls attention to the fact that normal urine is lævogyric, and concludes that there must have been present some dextrogyrate body, as diabetic sugar, to have permitted the analyzing prism to have marked zero.

In an article upon clinical saccharimetry, incited by deprecatory remarks upon approximate clinical methods, and his own in particular, by certain writers, Duhomme ⁸⁴⁵ Oct., '90, to Jan. insists upon the relatively greater value of the simple methods; and insists upon the absence of necessity for the very exact demands made by professional urinalists. There is no doubt but that the endeavors on the part of some to limit a practice which should be general to the difficulties and labor of the laboratory have a tendency to prevent much good which would result from wide-spread and simple methods; the loss of half a degree in percentage of sugar in urine

makes no perceptible difference in the diagnosis and prognosis, provided, of course, for the sake of comparison, the error run through the whole set of examinations during the course of a case.

Other Reducing Substances.—In a paper upon glycuronic acid, Ashdown,² reviews briefly the history of this substance, and contributes interesting clinical and experimental notes upon the subject. He has detected it in the urine after the administration of chloroform, morphia, and probably curare; numerous examinations after the use of ether failed to discover its presence. The appearance of this substance in the urine has been mentioned by various writers after the administration of chloral hydrate, croton chloral, camphor, etc. As the result of administration of chloroform to dogs, the nerves of the left kidney had in each case been cut. Ashdown is led to believe that the glycuronic acid which appears in the urine is not simply exuded from the blood, but that its secretion is the result of some distinct chemical process presided over by the renal epithelium. Ashdown has found a case of the occurrence of this substance in the urine of an apparently healthy man aged 24 years. The urine was not increased in quantity, and its specific gravity was normal.

Moritz³²⁶_{B.M.H.S.A.} states that the relative reduction power of normal urine, determined after a large series of experiments, is greater than described by Salkowski and Munk. The absolute amount of reducing substances excreted in twenty-four hours amounts to about 3.46 grammes (53 grains), and depends largely upon the nitrogenous reception of the individual. This reducing mass is composed largely of uric acid and creatinin, the former of which possesses about half the power of glucose to reduce copper solutions. One hundred grammes of creatinin appear to have an equivalence of 93.35 grains of glucose.

Moritz concludes from his researches that in the reducing power of urine these substances may accomplish as their share as much as 50 per cent. or more. Pathological urine is apt to show a much greater reducing power than normal, chiefly because of its higher degree of concentration.

Alkaptonuria.—The alkapton of Bödeker, a yellow, viscid, sugar-like body found occasionally in the urine, has been studied by Kirk²_{Nov. 22, '96} in relation to the substance which he names urolencic

acid. This latter substance, according to Huppert, is a homologue of gallic acid ($C_7H_6O_5$) and is probably pyrogallol-propionic acid, or, at least, a trioxy-phenyl-propionic acid $[(HO)_3C_6H_2, CH_2, CH_2, COOH]$. These views are held because its reaction with Millon's reagent (nitroso-nitrate of mercury) is not quite a red, as it should be, if it contained but one HO radical in the benzene nucleus; because it is optically inactive, and hence contains no HO in the CH_2 groups and hence all three in the benzole; and because it is very like gallic acid $[(HO)_3, C_6H_2, COOH]$ in its general behavior. Kirk believes the body known as alkapton by Bödeker really consists of some substance mixed with urolencic acid and hippuric acid. He is never able to get the acid from any urine but that passed by alkaptonurics. This acid has quite an antiseptic property, as shown by its power of preservation of meat in watery substances when added, and the writer adds a case of typhoid fever occurring in an alkaptonuric, in whom the type of the fever seemed to be strangely mild. Kirk suggests the possibility that the presence of urolencic acid in the system of the patient may have had an antiseptic effect.

The writer makes certain modifications in the method of isolation of this acid from that published in the ANNUAL for 1889. It has been found, for instance, that it may be prepared from evaporation of its watery solution over the water-bath, instead of extracting with ether or evaporating *in vacuo*. If it is further purified by twice precipitating with lead acetate, it does not darken so much upon heating. As to the other substance supposed to be present in alkapton, the uroxanthic acid of the writer, it is found that it is nearly altogether composed of urolencic acid, held in an impure state.

Diaceturia.—Binet¹⁹⁷_{Sept. 90} has examined the urine of 150 children in relation to this symptom, of which 69 showed the characteristic reaction with solution of bichloride of iron. Of 23 cases of pneumonia and broncho-pneumonia, 10 succeeded in showing the presence of diacetic acid; of 6 cases of pleurisy, none; of 26 of measles, 16; scarlatina, 34 cases, the reaction present in 27; erysipelas 4, 4 succeeded; of 31 of diphtheria, 11; of various suppurative diseases, 13 cases, 2 succeeded (1 of bone tuberculosis and 1 of subdiaphragmatic abscess); of 4 cases of typhoid, 2; of 6 of pulmonary tuberculosis, none; of 4 of tubercular meningitis,

gitis, 2; of 6 of whooping-cough, none; of 2 of rachitis, none; of 2 of chlorosis, none; of 1 of perityphlitis, 1; of 1 of mumps, none; of 1 of mitral disease, none; of 3 of scrofulous cachexia, none; of 1 of extensive burn, 1; of 2 of false croup, none; of 15 of acute nephritis, 2; of 4 of chronic nephritis, none; of 1 of osteosarcoma, 1. Of these 69 cases of diaceturia only 3 were entirely apyretic. Febrile diaceturia is, then, a phenomenon common in children, but it does not occur uniformly in all febrile conditions. The conditions determining its presence are obscure; it presents no definite relations with the intensity of the fever, the dyspnœa, nor with any digestive disorders. It is especially frequent in scarlet fever, and in doubtful cases its presence and degree may be regarded as of some diagnostic value. It is likewise quite frequent in erysipelas, if one may be permitted to draw conclusions from so few as 4 cases. In measles it occurs less frequently, and generally with less intensity, than in scarlatina, and is less persistent; in diphtheria it is not at all frequent.

CHYLURIA.

A case of chyluria with the presence of filariæ is recorded by Slater.⁶ The patient, aged 57 years, had lived for twenty years in the tropics, part of the time in Ceylon, where filariosis is not uncommon. The patient first noticed the chylous character of the urine in the Autumn of 1886, and when under observation in the summer of 1887 the urine was persistently chylous. The urine, under the microscope, presented a fine, granular basis, with few cells and no casts. It was generally acid, sometimes alkaline, with very variable specific gravity, ranging from 1005 to 1033. It presented very changing degrees of opacity, from a dense milk-white to a very faint opalescence; as a rule, that passed between 1 A.M. and 8 A.M. was the least turbid, and food seemed to increase the milkiness. The blood showed filarial presence, as a rule, from 7 P.M. until 5 A.M., the period of maximum being about midnight. On one occasion the organisms were discovered as early as 3 P.M. Reversing the habits of the patient, so that night became his waking and eating hours, had the effect of reversing the period of filarial presence in the blood; so that, instead of finding them only at night, they were to be found pretty constantly between the hours of 5 A.M. and 7 P.M., although a complete reversal was not obtained during the ten days of experiment, as they were also to

be found to a certain degree at night. Above the left clavicle, and just external to the sterno-clavicular joint, there was a distinct, dull, soft, ill-defined tumor, possessing what was probably a communicated pulsation. A similar but less well marked tumor was to be seen on the right. The external jugular on the left was slightly engorged; the left pulse was decidedly the stronger. The abdominal aorta was unusually prominent, and a bruit could be heard over it. He complained of pain in the left arm and in the epigastrium. The pains continued during his stay in the hospital, but eventually the left hand and arm became anæsthetic. The patient left the hospital and died elsewhere; no post-mortem examination was obtained. A case of filarial chyluria is reported by Lawrie,²³⁹ in whom, other treatment having failed, thymol was administered in 1-grain doses every four hours, this dose afterward being doubled. Under this medication the filariæ disappeared after a few weeks from the blood, and the urine gradually improved until in about two months it had resumed its normal character. Two months later no recurrence of the pathological condition had taken place.

Two cases of chyluria, both occurring in patients who had previously lived in the American tropics. The blood was not examined for a parasitic origin for these cases. Under the administration of large doses of gallic acid the first gradually improved until apparently well, but in five months the phenomena had recurred. In the second case the syrup of the iodide of iron was given in full doses, with the result of a return to normal on the part of the urine in nine weeks. Both these cases were habitually very much constipated, and the writer refers to a possible causal relation between this evidence of indigestion and the urinary symptoms. Myers² publishes the following interesting case of a young woman, aged 27 years, who had been a healthy child until she was 11 years old. At this period she began to complain of pain on the outer aspect of the left thigh. She was treated for sciatica in this limb for a number of years, and when 16 years old a seton was inserted in the upper portion of the left thigh, and during the operation a milky fluid was seen to escape from the wound in considerable quantity. At that time the limb was larger than the right, especially after exercise. Twenty or more small, vesicular prominences were to be seen upon the inner

and outer aspects of the upper portion of the thigh, the contents of which were found on examination to be chylous. Recently, after an illness of several months' duration, the fluid from the vesicles disappeared, and chylous urine has since been passed in large quantities daily, micturition being sometimes impeded by coagula in the bladder blocking the urethral entrance. At such times a chill is present, low temperature, pain in the back, mental depression, restlessness, followed by a slight increase of temperature and acceleration of circulation. The urine, if permitted to remain in the vessel for a short time, coagulated into a semi-solid mass, pinkish in color from the slight presence of blood. Its color was milky, specific gravity 1020, neutral reaction, contained several grains of albumen to the litre, and but a trace of urea. Under the microscope masses of granular matter and a few blood-cells were to be seen; no renal casts. Examination of the blood at frequent intervals at the time of day when filarial embryos are usually found failed to show their presence. Whatever the cause, there was evidently present in this case, to account for the chyluria, a condition of lymphatic enlargement.

Wehlau⁵⁰₁₈₈₁ reports a case of chyluria occurring in a woman aged 67 years, a native of Germany, but residing in the United States (Pennsylvania) for more than thirty years. The symptom developed during an attack of croupous pneumonia of the left lower lobe, on the ninth day of the disease. The urine resembled much the appearance of coffee weakened by a large excess of milk. On standing awhile it separated into three strata, the upper one of a creamy substance, the lower showing white, fibrinous coagula, and the middle one unchanged. Reaction neutral, specific gravity 1022. Under the microscope nothing but molecular fat and oil-drops were visible. The next urine was normal, except for a large amount of urates. So far as known, the woman had never before passed such urine. No filariæ were found in the blood.

Diago⁴⁵⁹₁₈₈₈ presented a work upon the hæmatochyluria of warm climates before the Medical Congress of Cuba, in which he stated that he had not found filariæ present in the blood of more than 5 cases, and not more frequently than he had discovered the condition to be due to the embryo of *bilharzia hæmatobium*. In the discussion following the paper remarks were made by various Cuban

physicians which tended to corroborate the position of the writer. Bayet¹⁷_{Sept. 25} publishes the details of a case of hæmatochyluria which presented the usual clinical features of the filarial disease. He made numerous examinations of the urine for the presence of this parasite, but failed to discover it; it would appear from the records that it never occurred to the writer to look for the embryonal parasite in the blood, and this failure invalidates the claim put forth that his was a case of non-parasitic chyluria. A case resembling that of Wehlau's, already mentioned, in the brief duration of the phenomenon, is reported by Hunt,²_{Feb. 25} in which the symptom occurred only in one micturition after a fall from a height of about 10 feet upon a lot of stones, from which it is probable that there occurred a rupture of a lymphatic at some point in the urinary tract.

LIPURIA.

Drecker⁴¹_{Apr. 7} mentions the case of a female child aged 28 months, with the following history: In October of last year she was ill with catarrhal symptoms of the lungs and stomach, from which she apparently recovered in three weeks. In February of 1890 the face began to swell; the child seemed dull, sleepy, and very thirsty. The skin was dry, cool, and, on the upper parts of arms, finely desquamating. What perspiration there was had an unpleasant odor. Tongue heavily furred, and vomiting frequent; five or six times daily there was a white, pap-like stool, with dark streaks through it. The belly was distended with ascites. The region of the kidneys was tender; arms and legs not swollen. The quantity of urine was not abnormal; it was clear, but over the surface there floated a layer of butter-like substance which, on application of heat, appeared like ordinary fluid fat. The urine then became milky, and looked like a thin meat-broth, with fat floating on it. It had a peculiar aromatic odor, different from that appearing generally on boiling ordinary urine. A drop on blotting-paper made a greasy mark, not disappearing upon drying. Heated in a test-tube, this substance gave off an acrid, pungent odor, like that of acrolein. It dissolved completely in ether and chloroform; and when heated with liquor potassæ it became saponified,—thus proving it to be fat. It was present in 4.35 grammes (1½ drachms) in 100 cubic centimetres (3¾ ounces). No albumen could be discovered, and no cause for the condition could be given.

CYSTINURIA.

As pointed out in a previous communication, Udransky and Baumann,⁸³ have found in the urine of a patient cystinuria cadaverin (pentamethylendiamine) and putrescine (tetramethylen-diamine). In a more recent article they consider at length the indication and occurrence of these diamines. By agitation with benzoyl chloride, the diamines, after treating the urine with excess of sodium-hydroxide solution, are converted into benzoyl compounds insoluble in water, and may then be separated by treating with ether and alcohol. The formation of cadaverin ($C_5H_{14}N_2$) was, in nearly every instance, the greater, forming almost two-thirds of all the benzoyl derivatives. The relation between these two diamines was not, however, constant. The average daily excretion of benzoyl compounds amounted to 0.2 to 0.4 gramme (3 to 6 grains), the examinations extending over four periods of from eight to eighteen days for a year. In order to determine whether the diamines stand in dependent relations with cystinuria, these investigators examined the urine of healthy individuals as well as of persons sick with scarlatina, diphtheria, typhus fever, pneumonia, peritonitis, and suppurative affections. In these cases no diamines were found. Inasmuch as Brieger had demonstrated the formation of diamines in cultures of cholera bacilli, as well as in cultures of the comma bacillus of Prior and Finkler, the fæces of the patient were examined, and the presence of the diamines determined in a quantity of about 0.5 gramme (8 grains) during the day. The pentamethylendiamine was, however, shown to be present in a less proportion than in the urine, not more than 10 or 15 per cent. of the combined diamines being cadaverin. Diamines had been noted in the stools of cholera cases by Brieger and Stadthagen, and, too, in the fæces of cystinuric cases. It seems probable from these investigations that in cystinuria the formation of diamines takes place in the intestinal canal through the action of certain micro-organisms, and that these substances are therefore to be looked upon as a disease symptom. They are absorbed from the intestines and excreted with the urine; and in this relation cystinuria and diaminuria are evidences of infectious disease.

Mester,^{83 54} regards the method of estimating the total amount of sulphur and the amount of unoxidized sulphur as still the best means of determining the amount of cystine in the urine.

The difference between these, after subtraction of a certain amount for ether-sulphonic acid, is taken as the amount of cystine present. This writer insists upon the fact that the mere recognition of the amount of cystine deposit is not sufficient, in that cystine varies much in its solubility in the urine with the reaction and sodium chloride of the latter. From studies upon the influence of diet upon the excretion of cystine, this investigator obtained in general only negative results; and Mester suggests the results of other authors, stating a direct relation between the diet and cystine excretion, to be due probably to the fact that only the cystine sediment was determined in their investigations. Thinking, from the occurrence of diamines in the urine of cystinurics and in certain other conditions, that the cystine might be the effect of anomalies of fermentation in the intestinal canal, Mester has made examinations after the use of thymol and alcohol as disinfectants, but without result.

UREA.

Hecht,³⁴ has succeeded in preparing the following thioureas as substitution products of propylsenfö. This latter is a limpid, highly refractive, colorless liquid, with a boiling-point of 152.7° C. (303.5° F.) and a specific gravity of 0.9909 at 0°. It is prepared from propylamin, and has the following composition: C_3H_7NCS . The list of thioureas formed from this basis, crystalline and melting unchanged, comprises the following: (a) propylthiourea ($C_3H_7NHCSNH_2$), monosymmetrical, crystalline, melting-point 110° C. (230° F.); (b) methylpropylthiourea ($CH_3NHCSNHC_3H_7$), melting-point 79° C. (174.2° F.); (c) ethylpropylthiourea ($C_2H_5NHCSNHC_3H_7$), melting-point 52° C. (125.6° F.); (d) dipropylthiourea ($C_3H_7NHCSNHC_3H_7$), melting-point 71° C. (159.8° F.); (e) dipropylurea ($C_3H_7NHCONHC_3H_7$), the sulphur having been abstracted from d by means of mercuric oxide, melting-point 105° C. (221° F.); (f) propylallylthiourea ($C_3H_7NHCSNHC_3H_5$), melting-point 105° C. (221° F.); (g) propylphenylthiourea ($C_3H_7NHCSNHC_6H_5$), melting-point 63° C. (145.4° F.). Besides these, Hecht has been able to produce the following thioureas by substitution, which heretofore have not been obtained, or only in a syrupy consistency: (h) dimethylthiourea ($CH_3NHCSNHCH_3$), melting-point 51.5° C. (124° F.); (i) methylallylthiourea ($CH_3NHCSNHC_3H_5$), with melting-point 52° C. (125.6° F.);

(j) ethylallylthiourea ($C_2H_5NHCSNHC_3H_5$), with melting-point $47^\circ C.$ ($116.6^\circ F.$); (k) diallylthiourea ($C_3H_5NHCSNHC_3H_5$), melting-point $49.5^\circ C.$ ($120.7^\circ F.$); (l) ethylpententhiourea ($C_2H_5NHCSNC_5H_{10}$), derived from ethylsenföl and piperidin, melting-point $46^\circ C.$ ($114.8^\circ F.$). This last compound was not, however, obtained entirely pure.

Heaton and Vasey's Approximate Estimation of Urea.—

Heaton and Vasey⁶_{May 10},⁵⁹_{Aug. 16} describe a simple method for the approximate estimation of urea in urine. The following arrangements are made: 1. An 8-ounce (249 grammes) bottle is fitted with a thistle-top funnel and bent-glass delivery-tube, as though for the preparation of hydrogen. The lower end of the funnel should be bent upward, like a small hook, in order to prevent gas from passing up it. 2. A small basin or breakfast-cup may be used as a pneumatic trough, a 4-ounce (124 grammes) bottle, or larger, of any shape, being filled with water and inverted in it in such a manner that the end of the glass delivery-tube can readily be brought under the mouth of the bottle. 3. A 40-per-cent. solution of good commercial caustic soda is prepared. For example, $\frac{1}{2}$ pound (avoir-dupois) of soda may be dissolved in water, and when cold diluted to 1 pint. The analytical process is as follows: 1. Into the gas-generator is poured by means of the funnel 1 fluidrachm (4 cubic centimetres) of bromine, washed in by 10 fluidrachms (37 cubic centimetres) of the soda solution. The generator may then be immersed in cold water and the inverted bottle of water placed over the end of the delivery-tube. 2. Two fluidrachms (7.39 cubic centimetres) of urine, very carefully measured, are added and washed in by exactly 1 fluidrachm (4 cubic centimetres) of water. The 3 fluidrachms (11 cubic centimetres) so added will, of course, cause an equal volume of air to pass into the receiving-bottle. This is allowed for in the appended table. The generator is gently shaken: brisk effervescence takes place and gas equal in volume to the liberated nitrogen is collected in the receiver. The generator should be kept as nearly as possible at the temperature of the air. 3. When the evolution of gas ceases, the receiver is removed from the basin by means of the thumb or a glass plate and placed mouth upward on the table. It is now only necessary to measure in minims the amount of water to fill it. After deducting 180 (which may be taken as 200) minims (12 cubic centimetres) due to the air

displaced by the urine, each 100 minims added represents 0.25 per cent. of urea in the urine examined. If the urine contains more than 3 per cent. of urea, it is best to dilute it with an equal volume of water before making the determination. The following table gives the percentage of urea corresponding to the volume of gas liberated, as shown by the quantity of water required to fill the bottle:—

Minims of Water Required.	Percentage of Urea.
200 (12.00 cubic centimetres),	0.00
300 (18.48 cubic centimetres),	0.25
400 (24.64 cubic centimetres),	0.50
500 (30.80 cubic centimetres),	0.75
600 (37.00 cubic centimetres),	1.00
700 (43.12 cubic centimetres),	1.25
800 (49.30 cubic centimetres),	1.50
900 (55.45 cubic centimetres),	1.75
1000 (61.60 cubic centimetres),	2.00
1100 (67.76 cubic centimetres),	2.25
1200 (74.00 cubic centimetres),	2.50
1300 (80.50 cubic centimetres),	2.75
1400 (86.04 cubic centimetres),	3.00

*Warden's Apparatus*²_{Sept. 15.}.—This is a modification of Huebner's apparatus, using the hypobromite solution as reagent, and, as mentioned in the article criticising it, presents no special advantage. It consists simply of a long graduated tube closed at the lower end by a glass stopper. One of the important disadvantages about the apparatus is the large amount of hypobromite solution required. Cruise⁶_{Mar. 25} commends for simplicity and general excellence the well-known apparatus of Doremus for ureametry.

URIC-ACID DIATHESIS.

A. Haig¹¹⁶¹_{Feb., '90} reviews at length his opinion as to the relation of the formation and excretion of uric acid and the production of disease. The excretion of uric acid can be controlled and either increased or decreased within certain limits by very various means; but the formation of uric acid, in its relations to urea, cannot be controlled, although, under certain conditions, some part of the uric acid may be converted into urea. Uric acid is in excess in the blood not from direct overflow from the kidney, but from continued retention and storage of the small normal overflow by the renal vein. Such excess of uric acid in the blood is a cause of headache, mental depression, pulse of high tension, and possibly of epilepsy; and by its being driven out of the blood into the joints

it causes gout and acute rheumatism. It is further suggested that the plus tension of the pulse, as produced by uric acid,²_{Jam. 11} is the cause of albuminuria and nephritis; also that many diseases until now more or less indefinitely connected with gout may be found to be directly connected with it, through the effect of uric acid on the arterial tension and the circulation in the skin, brain, lungs, liver, kidneys, and other viscera. Foods which increase the actual formation of uric acid, as meat, and further, by raising the acidity, tend to prevent its excretion, do harm in such diseases as gout and rheumatism, which are due to its retention, and also indirectly in such diseases as headache, mental depression, high-tension pulse, and others, which result from its subsequent excess in the blood. Absolute large formation of uric acid has, by itself, no evil effect in these diseases, but it is apt to be retained in the body in excess. The best treatment, then, is to diminish the formation of uric acid, urea, and acids, as far as compatible with healthy function, and, further, to use some means to diminish the acidity, so that nothing should interfere with the full excretion of uric acid. These indications are best fulfilled by reducing very greatly the animal food, eating largely of fruits and vegetables, and avoiding beer and wine. Exercise is of use in aiding excretion in lowering acidity, though uric acid may be increased. Among drugs, Haig regards as of first value the salicylates in increasing the excretion of uric acid. A large number of drugs,²_{Nov. 20, '90} as iron, lead, the mineral acids and their salts, and probably antipyrin and nitro-glycerin, have one effect in common—that of diminishing the uric-acid excretion, probably by driving it out of the blood into the liver, joints, etc. Opium and morphia diminish the excretion of uric acid, and at the same time reduce pulse-tension and cure the headaches of lithæmia, probably in the same manner as the iron group.

In connection with these views as to the production of uric acid, the following conclusions of Schultze²⁴⁶_{Nov. 4, '91} are of interest. The investigation was carried out upon a human subject with a view of comparing variations in the amount of urea nitrogen and the non-urea nitrogen in relation to diet: (a) the urea nitrogen increases in proportion to total nitrogen as the diet approaches a purely albuminous composition; (b) the uric acid increases absolutely, but diminishes relatively, both to total nitrogen and to the urea, on a meat diet, especially if large quantities of alkaline water

be taken and alcoholic drinks and narcotics be avoided; (c) probably in fever the same relation of uric acid to total nitrogen and urea holds.

Von Jaksch ⁶⁹_{Aug. 14} publishes an interesting paper on uric acid in the blood, considering, mainly, two points: (a) whether uric acid takes a prominent part in the "acid intoxication" described by himself, Peiper, and others; (b) whether it is only in attacks of gout that uric acid occurs in the blood. The total number of patients on whom observations were made was 105. In 9 cases of healthy individuals no trace of uric acid could be detected; neither were there any xanthin derivatives present. In nervous affections, as tabes, multiple sclerosis, polyneuritis, and brain-tumors, the results were also negative; on the other hand, in such cases the blood frequently contained compounds of xanthin, especially hypoxanthin. Nine of the 105 cases were patients with enteric fever, but uric acid was never found in the blood. In 1 case, however, in which the temperature had fallen, small quantities were discovered. In a case of irregular intermittent fever the results were analogous. During the febrile attack no uric acid could be detected, but in the intervals it was present. Diseases of the liver, intestinal tract, and stomach only led to the presence of uric acid in the blood (uricacidæmia) when there was profound anæmia. The substance was found in the blood in cases of cardiac disease in which there was much cyanosis. In affections of the lungs and pleura it was most frequently detected in emphysema, and when there was pleural exudation. It occurred constantly, and in considerable quantities, during the febrile stage of pneumonia (5 cases). In acute rheumatism it was never found. A certain amount was found in renal disease. Considerable amounts were also observed in cases of marked anæmia, both primary and secondary. Von Jaksch, then, comes to the conclusion that uricacidæmia is not pathognomonic of gout. In relation to the first inquiry of his investigation, he concludes that uric acid is not often found in febrile "acid intoxication," but that it may be so. It is important to notice that all morbid processes leading to the overloading of the blood with carbonic acid also produce this condition, and, the greater the cyanosis, the more uric acid is found in the blood. Therefore, it would seem that we must ascribe the presence of uric acid to a disturbance of the inter-

change of gases in the lungs, such as occurs so largely in pneumonia. Von Jaksch reconciles his opinion with the discovery of uric acid in the blood in anæmias and in nephritis by stating that the red blood-corpuscles, whose duty it is to further oxidize uric acid, are deficient in both these conditions; and he concludes that uricacidæmia in general is due to disorders of red blood-corpuscles, the vehicle by which oxygen is carried. This view of von Jaksch is of extreme importance, tending to uphold, as it does, the theory of Ebstein, that uric acid is to be looked upon as a by-product from insufficient oxidation of the nitrogenous waste into urea. It is not, however, entirely opposed to the foregoing view of Haig, that, in its production of gout and acute rheumatism, uric acid disappears from the blood and juices of the body, and is deposited in the joints and liver. Conklin¹⁸⁶_{May, Sept.} reviews the general status of the relation between uric acid and disease, and details a number of well-marked instances of nervous, mental, nephritic, and other organic diseases which seem to sustain the position of an effect of diminished uric-acid excretion. In these details and in the general trend of his paper Conklin would uphold the ideas promulgated by Haig upon this subject. Salkowski,⁸¹⁹_{Jan. 96} from the study of uric-acid excretion mentioned in last year's edition, discusses the signification of an increase or a diminution of the excretion of uric acid. The uric acid plays a similar part with regard to inflamed tissue as do lime salts, being deposited therein (contrary to the opinion of Ebstein, who believes that uric-acid deposition acts as an excitor of inflammation) as the result of retrograde changes in inflamed areas.

In relation to the precipitation of uric acid in the human urine, Roberts²_{Mar. 20} explains this phenomenon in that in normal urine uric acid exists in the form of quadurates, a superacid combination first discovered by Bence-Jones. These quadurates, quite soluble in normal urine, are easily decomposed, and set free the uric acid in the presence of water. This takes place, too, in the course of three or four days in urine, varying in different specimens. The most important factors found by Roberts in holding the quadurates thus in solution are the salines and next the pigments of the urine. This statement is verified by Johnston in the discussion, who called attention to the frequency of uric-acid calculi in Southern China, where salt is obtained with some difficulty by the natives.

(Myers,⁶_{July 19} denies the frequency of calculi in South China, except in Canton, and the scarcity of salt as an article of dietary.) Shearer¹⁸⁷_{July} corroborates the foregoing opinion as to the importance of a low amount of saline matter in the urinary excretion as determining the precipitation of uric acid to the formation of concretions and calculi. He calls attention to the frequent appearance of uric-acid calculi in British India (where the government derives something like £6,000,000 from its salt tax!) and in other localities where, for some reason, salines do not enter very much into the food of the population.

Quinquaud,³_{Apr. 19} with a view of determining the potency of uricacidæmia (uric-acid diathesis) in the production of dermal lesions, has administered to human subjects from 20 to 40 centigrammes (3 to 6 grains) a day. The lesion most commonly following the administration was of a furuncular nature, sometimes papular or erythematous patches,—in general the appearances of the eczemas. Cheatham,²²⁴_{May 24} and an editorial writer,¹_{Feb. 15} call attention to the frequent occurrence of lithæmic inflammatory manifestations in the throat and nose, in the auditory apparatus, and in the eye,—troubles which, as a rule, only demand to be recognized to be benefited by alkaline treatment. A case mentioned by Wright¹³⁹_{Aug.} illustrates one of the various nervous manifestations of uric-acid diathesis, in the occurrence of a gradual but eventually a complete paralysis of the lower limbs, but with plantar and knee reflexes intact. There was paralysis of the bladder, but no spinal tenderness, no priapism, no inco-ordination or localized contractions of muscles at any time. The urine was noticed to contain a large amount of uric acid; and under alkaline treatment this gradually disappeared, and with it the nervous symptoms, in a few weeks.

In the therapy of uric-acid diathesis, Schöndorff,²⁴⁶_{No. 46, p. 529} has performed a series of observations upon the influence of drinking-water on the excretion of uric acid. As a result, he concludes that there is practically no difference to be observed whether little or much water be drunk, thus denying the results of Genth, who stated that under the influence of water-drinking uric acid completely disappeared. Posner,⁴_{July}, in continuation of his researches upon the solvent action of mineral waters, heretofore noted, shows that the urine is in best condition for solution of the uric acid when of low specific gravity and not of intense reaction, either acid or

alkaline. In the intense acid condition the uric acid is promptly thrown out of solution, and in the opposite condition there is danger of forming some of the insoluble alkaline urates or earthy urates. He believes, therefore, that for therapeutic purposes it is preferable to administer the remedies in the shape of mineral waters, which renders the urinary fluid copious and diluted. The waters had best be taken at intervals through the day, in order to avoid the production of an alkaline urine; and, as a practical point, he states that the earthy waters, as those of Wiedungen and Contrexéville, are not so well tolerated as the alkaline waters, as those of Fachingen.⁸⁴ Fürst⁴¹ recommends the use of the Kronenquelle water in the uric-acid diathesis, not above the waters of Grand Guille (Vichy), Bilin, Luciusquelle (Tarasp), or Fachingen, but above those of Oberbrunnen, Assmannshausen, Salvator (Eperies), and Königsquelle (Wiedungen), for its solvent power over uric acid.

In America the waters of Buffalo Lithia Spring are commended by Wile¹³⁸ and Claiborne.¹ The solvent action of lithiated hydrangia has given uniformly good results in the hands of Shimpoch,⁸⁸ who records a case of uric-acid concretions in a child, which were broken up and largely dissolved by this agent. Adolphus²⁰² lays stress in his article upon the value of exercise and open-air life in the lithæmic state, urging the efficacy of forced inspiration to bring sufficient oxygen into the blood to complete the transformation of azotized matter into urea.

URIC-ACID REACTIONS.

*Rosenberg's Reaction.*³¹⁹—In a preliminary communication, the following reaction is given by Rosenberg: If the urine of man be mixed with about an equal volume of 5-per-cent. solution of phosphotungstic acid and a drop of a solution of caustic potash, or soda, or ammonia be added, a blue color ensues. Examination has shown that this color is given by the uric acid and depends upon a reduction process. The test is reliable only in the urine of man and the carnivora.

Silver Method.—Salkowski²⁵ shows that the volumetric method of Haycroft, Hermann, and Czapek of estimating uric acid is based on the false assumption that the precipitate formed by the silver solution in ammoniacal urine contains one molecule

of silver for each molecule of uric acid. In reality the precipitate has no constant composition, but in every case contains more silver than the above proportion. Usually there are four atoms of silver to three of uric acid. While the foregoing investigators obtained satisfactory results by their method, it was because the silver precipitate in their method was insufficiently washed and some chloride was retained. On dissolving the precipitate in nitric acid some silver remained as chloride, and thus too little silver was found.

Arthaud and Butte's Method.—Gautrelet²⁹⁰_{Jan. 30} criticises the original methods of these experimenters, in which sulphocyanide of copper was employed in a solution of hyposulphite of sodium, and suggests the following change in the solution, which he commends as accurate:—

Solution A :—

Sulphate of copper, . . .	2.968 grains (0.21 gramme).
Hyposulphite of sodium, . .	40. grains (2.59 grammes).
Tartrate soda and potassium, .	80. grains (5.18 grammes).
Distilled water to . . .	1000. grains (65.00 grammes).

Solution B :—

Ferricyanide of potassium, . .	2. grains (0.18 gramme).
Hydrochloric acid, . . .	10. grains (0.65 gramme).
Distilled water to . . .	100. grains (6.48 grammes).

A few drops of B are scattered over a white porcelain plate. Then (a) measure out 20 cubic centimetres ($5\frac{1}{2}$ drachms) of the urine to be examined; (b) if it be cloudy, from separation of uric acid or urates, heat to 50° C. (122° F.) until clear; (c) add 5 cubic centimetres ($1\frac{1}{2}$ drachms) of acetic acid of 10-per-cent. strength; (d) add A, drop by drop, with constant agitation, until a drop at the end of a glass rod gives a chestnut-brown color to B, scattered on the plate; (e) read off the volume of A used from the burette. This burette is marked in such a manner that each degree corresponds to 1 centigramme ($\frac{1}{4}$ grain) of uric acid (1.428 grain—0.091 gramme—copper sulphate required to precipitate 1 grain—0.065 gramme—of uric acid).

Bayrac's Hypobromite Method.—Bayrac²⁴³_{May 5, Feb. 20} proposes a method for estimating the uric acid in a urine by separating it from the other azotized substances, by means of alcohol, and, when isolated, by acting upon it with a strong solution of hypobromite of soda at a temperature of 90° to 100° C. (194° to 212° F.). He states that a complete estimation may be made in two hours,

at most, and that its results are quite similar to those of the most delicate. The method consists briefly in taking 50 cubic centimetres ($1\frac{7}{8}$ ounces) of urine, evaporating it over a water-bath to 2 or 3 cubic centimetres (33 or 48 minims). Then a few drops of hydrochloric acid are added to completely precipitate the uric acid, and afterward about 30 cubic centimetres (1 ounce) of 95-per-cent. alcohol are added with agitation, and thrown on an open filter-paper. The alcohol takes up the hydrochloric acid by its excess, creatinine and its hydrochlorate, urea and its salts, and upon the filter are left uric acid and its salts. The filter is dried, and the residue separated from it and treated with 5 cubic centimetres ($1\frac{1}{2}$ drachms) of distilled water and 10 or 20 drops of soda solution, and then tested with hypobromite solution in an apparatus proposed for the employment of heat, and the amount of uric acid estimated from the amount of nitrogen evolved.

PHOSPHORUS, ETC.

Estimation of the Total Amount of Phosphorus in the Urine.—Chappelle²¹¹_{Doc. I. 70} proposes the following method for estimating the total amount of phosphorus in the urine. Ten cubic centimetres of urine are permitted to remain for about two hours upon a sand-bath with 5 cubic centimetres ($1\frac{3}{8}$ drachms) of pure sulphuric acid. It is then heated over a Bunsen burner until all color is discharged. When cool, 40 cubic centimetres ($1\frac{3}{8}$ ounces) of distilled water are added. Then 100 cubic centimetres ($3\frac{3}{4}$ ounces) of citro-ammoniacal solution and 25 cubic centimetres ($6\frac{7}{8}$ drachms) magnesia mixture are added; the whole is agitated and then let stand for fifteen minutes. Then 10 cubic centimetres ($2\frac{7}{8}$ drachms) of ammonia are added, the whole shaken again, the cover put over the vessel, and it is again permitted to stand for two or three hours. A precipitate separates if ammonium-magnesium phosphates form (if it fails to separate well, 5 or 10 cubic centimetres— $1\frac{3}{8}$ to $2\frac{7}{8}$ drachms—more of ammonia are added), and the supernatant fluid is then poured off and the precipitate thrown on a filter. It is washed several times with 25 or 30 cubic centimetres ($6\frac{7}{8}$ to 8 drachms) ammonia (1 to 3), dried, and heated in a platinum crucible. The pyrophosphate of magnesia thus obtained is dissolved in nitric acid, filtered, and evaporated. When cool, the pyrophosphate is weighed, and from this weight

the amount of phosphoric acid and phosphorus may be calculated.

Oxaluria.—Neidert⁸⁴ offers a new contribution to the vexed question of oxaluria and nervous states connected therewith. It is still, he says, a matter of dispute whether oxaluria shall be regarded as a pathological entity or as a symptom of a pathological state. Neidert inclines to the view that it is a constitutional affection belonging to the same category as diabetes. According to several observations which he has made, diabetes in the parent sometimes entails oxaluria in the child. The conclusions at which the writer has arrived are as follow: A group of nervous manifestations of abnormal character, lasting for several years, may, under the influence of certain causes, undergo transformation, more or less suddenly, into a pathological state, which is characterized by the presence in the blood and by the excretion of oxalate of lime in the urine. In such cases we have to deal not with an accumulation the result of dirt, but with an abnormal and continuous production of oxalic acid at the expense of the tissues of the organism. There is present a distinct, individual predisposition, an alteration of the nervous system and very likely of the cerebrum; the result of this enervation is a retardation of nutrition, or, it may be, a qualitative transformation of sugar circulating in the economy (Cantani). The abuse of gaseous waters, as Seltzer, has a considerable importance in the etiology of oxaluria. Heredity also plays a part, in which diabetes may alternate with oxaluria. Oxaluria is a disease *sui generis*, which, by itself and the accidents which it occasions, has a character of sufficient gravity to cause death. The ingestion of easily-digested nitrogenous food, similar to the diabetic regimen, limited to strict rules of diet, has been found to yield the best results in the treatment of this affection.

INCIDENTAL SUBSTANCES.

Homogentisine Acid.—Baumann²_{Aug.16} announces a new acid under this name. He states that tyrosin given to a patient led to a large increase of this acid, and considers it to be formed by the action of bacteria on the tyrosin normally found in pancreatic digestion.

Excretion of Phenol Compounds.—Reale⁸⁶⁷_{Jan} reviews the studies

of Spädler, Beiliginisky, and Baumann, the last of whom showed that the phenylic acid in the urine combines with sulphuric acid as phenyl-sulphuric acid, and is excreted as a salt, combined with an alkali, as potassium phenyl-sulphate. Besides this salt, Reale has found yet another phenyl compound, a combination between phenyl and phosphoric acid, when the phenyl compounds are in too great amount to combine only with sulphuric acid. Reale, from his investigations, concludes that these substances, the phenyl compounds, are formed in the liver. Mazzenga,⁵⁰⁶ after a long series of experiments, formulates the following conclusions as to the elimination of phenol in the urine: There is a constant physiological amount of phenol in the urine; but the author's estimation is not so high as Merck's, possibly because of difference in the character of the aliment of the persons upon whom the experiments were carried on, a meat diet, as shown in a dog, increasing it decidedly. In fibrinous pneumonia the phenol increases in the urine with the stage of resolution especially; in pulmonary tuberculosis with the formation and enlargement of cavities. In a case of perforating empyema, in a case of suppurative peritonitis, the phenol was distinctly increased in the urine; so, too, it rose very high (0.271 grain per litre) in a case of pulmonary tuberculosis dying suddenly from pulmonary apoplexy. In cases of icterus phenol was found constantly increased; it is commonly found in exudates and transudates.

Urethan.—Jaffé,⁸³ by employing the following method, has found that urethan (carbonic-acid ethyl, $C_8H_7NO_2$) is a constant element in the urine of man and dogs; it is found in largest proportion in the urine of dogs that have been fed on flesh. The alcoholic extract of a number of litres of fresh urine, obtained by the addition of alcohol after the evaporation of the urine, is dissolved in dilute sulphuric acid and then extracted with ether. The ethereal extract contains certain compounds which remain after distilling off the menstruum mixed with acid, oily products preventing crystallization. This, dissolved in water, is separated from the oil present by filtration, rendered alkaline with carbonate of sodium, and again treated with ether, when, after evaporation, a number of leaf-like crystals result. This is further purified by the basic acetate-of-lead method. The product thus obtained still contains a certain amount of urea, which is to be separated by

means of mercuric nitrate. Finally, the crystals are heated with petroleum ether, in which they are slightly soluble, and from which they re-appear, when cool, as fine, long needles.

Balsams.—Stockman,²_{Jan. 14} has conducted a series of experiments to determine whether the administration of these substances in their excretion gave rise to serious results in the renal tissue, the urine of cases taking these materials as medicaments giving rise to precipitates closely resembling albumen. He found that, while in general this precipitate might be mistaken for albumen, it is soluble in alcohol, and consists, really, in the balsam itself.

THE URINE IN DISEASE.

Gautrelet⁸¹_{Feb. 28} states that the present reigning epidemic disease shows the following urological peculiarities: In general cases there occur a considerable diminution in the volume of the excretion, an extraordinary augmentation of acidity, a notable diminution in the elements of organic waste, and the presence in the urine of indican. In diabetics (hyperacid), he states, there occurs a diminution or suppression of the glycosuria and a substitution of oxybutyric acid.

Exophthalmic Goitre.—De la Tourette and Cathelineau⁴⁵²_{Nov. 12, '99} state that in 3 cases of exophthalmic goitre during the apyretic periods analysis showed the urinary excretion to be normal; that in 1 case of exophthalmic goitre, during a febrile period of fever of some days, due to apparent inflammatory complications, the urine remained normal.

Pernicious Anæmia.—In a case of pernicious anæmia, Hunter¹⁵_{Nov. 10, 11, 12, '99} calls attention to three changes as sufficiently well marked to merit remark,—the presence of pathological urobilin in great quantity, the presence of blood-pigment appearing in the urine, and, too, in the cells of certain of the renal tubules in the form of granules, and an increased excretion of iron. All these changes point to the presence of a condition of excessive destruction of the blood.

Typhoid Fever (Ehrlich's Reaction).—Rütimeyer²¹⁴_{Mar. 15, May 15} has studied this reaction in 260 cases, comprising 2750 single examinations. It will be recalled that this reagent is made up as follows: A concentrated watery solution of sulphanilic acid and a $\frac{1}{2}$ -per-cent. watery solution of sodium nitrate are prepared. The reagent should then be prepared fresh for each examination

by adding to 200 cubic centimetres ($6\frac{1}{2}$ ounces) of the sulphanilic solution, 10 cubic centimetres ($2\frac{1}{6}$ drachms) of a pure hydrochloric acid and 6 cubic centimetres ($1\frac{1}{2}$ drachms) of the sodium-nitrate solution. To a quantity of this solution thus prepared is added an equal amount of the urine, and then ammonia is added to alkalescence. If the reaction occurs, there occurs a deep-red color, followed later by a green precipitation. In the hands of the writer the reaction invariably failed in health, in hysteria, myelitis, specific hepatitis, diabetes, cystitis, pyelonephritis, non-malignant cystomata of the ovary, cholelithiasis, and jaundice, various surgical affections, and, as a most important group, febrile and non-febrile gastro-abdominal catarrhs. Occasionally the reaction obtains in cases of cancer of the œsophagus and stomach, chronic nephritis, caries and cold abscesses, pyæmia, scarlet fever, serous pleurisy, tubercular meningitis, and cardiac failure. More frequently it occurs in croupous pneumonia, primary pulmonary actinomycosis, malignant disease (carcinoma, sarcoma, tuberculosis) of the peritoneum. In pneumonia the primary change noted is a yellow color, which changes to a light yellow. Most important and most characteristic are the results in typhoid fever and in phthisis. He concludes that the reaction has a high diagnostic value in typhoid, febrile catarrhs never giving the reaction, and, next to the splenic tumor and rash, this being one of the most constant and early manifestations. At the outset of the disease, presenting suspicious symptoms of typhoid, if the reaction obtains, an almost positive diagnosis may be made; if it does not occur in the first and second week, the case is not typhoid, or only the very mildest degree. The reaction bears no relation to the course of the fever; it is not affected by medicaments, and morning and evening urine show it equally well. Its disappearance after the second or third week bespeaks a favorable outcome; but its persistence indicates a long, slow, febrile course. The intensity of the reaction has no bearing on the prognosis; relapses are apt to show a re-appearance of the reaction, even if it has failed for some time. Wood⁴⁸ regards the test, from observations he has made, as entitled to a considerable degree of reliance, and states that, while clinical features must always be allowed to have their weight, the test does not vary through nearly so broad a range as the differential features in typhoid and simple continued fevers.

Bacnacci⁵⁷_{Dec. 3, '99} considers it probable that the reaction bears some relation to the sugar and acetone present in diabetic urine, in which he states he succeeded in producing the characteristic coloration almost invariably unless he previously boiled the urine. The reaction was also present in the urine of patients taking either iodol, soziodol, thymol, or strychnia, and occasionally in phthisis. In pneumonia, variola, acute enteritis, and typhus fever, in the hands of this observer, it usually failed.

The Urine in Neuroses.—A general article in review of the various forms of urinary pathological conditions occurring in the neuroses, as polyuria, oliguria, anuria, oxaluria, phosphaturia, albuminuria, mellituria, etc., is contributed by Peyer.⁴⁰⁴_{Jan. '99} Desnos,¹⁵²_{Dec. 10} in an article upon the psychopathies of micturition, endeavors to show that they are all owing to undue attention to the organs of urinary expulsion.

Effect of Sleep on the Urine Excretion.—Glenn³⁸⁵_{Apr. 2} finds that the average amount of urine voided during twelve day-hours to be 911 cubic centimetres (1 quart), and during twelve night-hours 661 ($1\frac{3}{10}$ pints),—100 to 71. The elimination of solids for every day-hour is 3 grammes (46 grains), and for every night-hour 2 grammes (31 grains). The flow of urine increases immediately after sleep; during the night up to morning the urine voided becomes constantly more concentrated.

TOXICITY, MICRO-ORGANISMS, ETC.

Toxicity of the Urine in Epilepsy.—Deny and Choupe,⁸_{Dec. 4, '99} from experiments, have come to the conclusion that in epilepsy the urine has the same toxic powers as in health, differing in no important manner, producing myosis, respiratory acceleration, increase in the urinary flow, lowering of temperature, etc.

The Urine as a Culture Medium.—Heller,⁴¹_{June 5} proposes, instead of the meat infusion used in making up the culture media for bacteria, that urine, which contains a certain proportion of salts, etc., should be substituted. He would take 1000 cubic centimetres ($2\frac{1}{10}$ pints) of a good, clear, fresh urine, of a specific gravity of about 1010, sterilize it, add soda solution just to alkalescence, and add 10 grammes ($2\frac{1}{2}$ drachms) of peptone, 5 grammes ($1\frac{1}{4}$ drachms) of salt (NaCl), and 50 to 100 grammes (13 to 26 drachms) of gelatin, or 10 to 15 grammes ($2\frac{1}{2}$ to 4 drachms) of agar-agar. Of

the pathogenic micro-organisms which grow fairly upon this as a medium, the author mentions staphylococcus pyogenes albus, s. p. aureus, streptococcus pyogenes, bacillus pyocyaneus, b. anthracis, b. typhoid fever, b. cholerae, b. diphtheriae (Löffler); of the non-pathogenic, micrococcus prodigiosus, m. ureæ, bacillus violaceus, b. lactis, b. fluorescens, etc. Of the filamentous fungi the following grow upon this medium: penicillum glaucum, mucor mucedo, a form of aspergillus, trichophyton tonsurans, etc.

Germicidal Property of Urine.—Having noticed the rarity of pathogenic micro-organisms in the urine, although they may have been present in the kidneys, Lehmann⁵⁰_{Apr. 15} instituted, with Richter, a series of experiments to determine whether their absence was owing to the filtration in the kidneys or whether the urine possesses germicidal properties. Anthrax and cholera were used in the experiment. Fifty cubic centimetres (1 $\frac{3}{4}$ ounces) of fresh urine were mixed with 1 cubic centimetre (16 minims) of a twenty-four-hour-old broth culture, and of the mixture 1 cubic centimetre (16 minims) plated and put in the incubator. Counting the colonies resulting, it was found that they were invariably diminished. The germicidal power thus shown seemed to be due to the acid phosphates present in the fluid, and, possibly too, to the sodium chloride.

Action of Aseptic Urine on Tissues.—Tuffier,⁸_{Mar. 19, June 18, July 9, Apr. 20, June 288}¹⁵¹ from injections of aseptic urine into the prevesical cellular tissue, was unable to excite suppurative or inflammatory changes. Injection of ammonium salts gave the same result, and the author concludes that the evil effects of urinary extravasation are due to micro-organisms present. Injection of normal urine into the peritoneal space of rabbits failed to excite peritonitis, and he opposes the pretended dangers from urinary infection in operations upon vesical tumors.

Urea Fermentation.—Moore¹⁰⁰_{Oct.} has isolated about twelve varieties of bacteria, mostly cocci, which occur in the urethral canal, and which have the power of ammoniacal fermentation in urine. Miquel¹⁶⁴_{Sept. 18}⁸_{Sept. 10} announces his discovery of a fermenting agent grown from the urine of cystitis cases in peptone broth to which carbonate of ammonium has been added, which has a strong power of conversion of urea.

Bacteria.—Hartge,²¹_{June 8, July 14} after trial of a number of media, was

at last able to cultivate the urinary sarcina upon agar-agar containing $\frac{1}{2}$ per cent. of neutral urine, requiring the temperature of the body and refusing to grow in presence of the ordinary forms of decomposition. The stomach sarcina, on the other hand, is readily grown on decaying media and at ordinary temperature. Neumann⁴¹_{Feb. 18} has found typhoid bacilli in the urine, out of 114 examinations, in 48 cases. He states that the large number of moving bacilli seen in the fresh urine of these cases is of diagnostic value, but that their identity with typhoid bacilli is only to be shown by culture experiments. He believes they find their way into the urine from the kidney, not by a simple filtration, but only during a sort of reactive inflammation about the capillaries, forming a sort of lymphomatous nodule, analogous to the skin eruption. They are, hence, to be sought during the same period as the existence of the rash, and apparently their numbers bear some relation to the intensity of the latter.

Weichselbaum,²²_{Feb. 18} in a case of pneumonia from the grippe, found the urine albuminous, and, upon examination by culture and the microscope, discovered the presence of diplococcus pneumoniae in the sediment. Two cases of bacteriuria in females are reported by Kendall²⁸⁴_{Apr.} in which the urine was rendered turbid by a form of streptococcus. Santwood⁷⁶⁰_{Nov. 15} calls attention to the frequency of the spontaneous invasion of the bladder by bacteria when there is residual urine, setting up fermentative and inflammatory results.

Lèques²⁴⁸_{Dec., '98} records a case of a soldier who, after nephritic colic of the right side, passed at intervals a number of small vesicles recognized as hydatids, leading to the recognition of a hydatid of the right kidney.

DIABETES MELLITUS.

Etiology and Pathogeny.—Of the various experimental studies published in relation to the origin of diabetes mellitus during the year, probably none have created such wide-spread interest as those of von Mehring and Minkowski.⁸⁴_{Jan. 1} From these experiments there seems to be established a direct relation between pancreatic disease and the presence of diabetes mellitus. In these experiments the pancreas was extirpated from dogs; and the observers noted that in case of total extirpation glycosuria followed, the course and

symptoms being quite similar to those of the disease in man. Where there was any portion of the tissue left sugar did not appear in the urine; nor did glycosuria develop from ligation of the pancreatic duct. From these results the investigators are inclined to state that the diabetes does not in any way depend upon alteration of the function of the pancreatic juice as it appears in the intestines, but that there probably exists in the pancreatic tissue a function of conversion of sugary material by an intermediate process into some metabolite suitable for use in the economy. The experimenters call attention to the care requisite in the performance of the operation, and the great tendency to suppuration and intestinal necrosis as a result. Dominicus⁵⁸⁷_{p. 901, '98} has made a series of similar experiments, but, while he has obtained in general the same results, he believes that the disease does not necessarily follow any loss of a special power of saccharine metabolism in the pancreas, but that it is rather due to the faults of digestion following upon the pancreatic disturbance. It may be of interest here to mention that as far back as 1877 Recklinghausen suggested some connection between atrophy of the pancreas and diabetes in his work upon the treatment of the latter.

The various theories which have received attention in relation to the etiology of diabetes may practically be reduced to these two: either that the glucose of the blood is not broken up in as full a degree as normally, or that it is present in excessive amount either from too large a quantity brought in the food or from an excessive production of hepatic sugar. Both these theories appear to express a portion of the truth, but do not suffice to explain all cases of diabetes, as these arising in connection with alterations of the pancreas. According to Lancereaux, who has noted the fact clinically, and the above experiments of Mehring and Minkowski, there must be some dependent relation between a certain class of cases and a loss of integrity of the pancreas.

In this connection Lépine²¹¹_{p. 29, '98} suggests the following mode of production: In the first place, it is known that diastase acting upon starch forms—not glucose—maltose; and the prolonged contact with the pancreatic diastasic ferment would appear (von Mehring) to convert the material which is produced by the liver—which is a sugar identical with maltose—into glucose. It seems possible, then, that for the fulfillment of the transformation of carbohydrate

matter into glucose it is necessary that pancreatic juice enter through the portal system after resorption of the chyle from the intestine, or by some other canal, into the liver, where it acts in conjunction with the hepatic function in order that it may aid in converting the hepatic sugar into an assimilable form; otherwise, it is excreted. This same writer,²¹¹_{Jan. 19} in order to substantiate the position which he assumes, *i.e.*, that the pancreas possesses a further function than is evidenced by the intestinal action of its secretion, details this experiment: A dog, without food for thirty-six hours, had the pancreas totally extirpated. Twenty-four hours later, when sugar was recognized in the urine, the dog was killed, and its arterial blood collected. A dog of the same size, fasting for sixty hours, without extirpation of the pancreas, was also killed, and the same details carried out as a control experiment. The blood of each was at once examined for sugar, and again half an hour later, after defibrination, and finally fifteen hours afterward:—

SUGAR PER 1000 GRAMMES (2 POUNDS) BLOOD.

	Healthy Dog.	Dog with Pancreas Extirpated.
At once, . . .	1.17 grammes (18 grains).	3.30 grammes (52 grains).
Half-hour, . . .	1.10 grammes (17 grains).	3.23 grammes (50 grains).
Fifteen hours, . .	0.72 gramme (11 grains).	3.04 grammes (47 grains).

Thus, the blood in the dog without its pancreas contained excessive sugar, and it lost by fermentation during the fifteen hours but 8 per cent. of sugar, while that of the healthy animal lost 39 per cent. Further, the blood of the healthy animal was found to be able to convert much more starch into sugar during the fifteen hours than that of the dog deprived of its pancreas. In the latter there is, hence, supposed to be less of a certain ferment which is necessary for the conversion of sugar into its proper metabolites than normal, this ferment being produced by the pancreas, probably. In a previous paper²¹¹_{Dec. 1, '99} Lépine had shown that if even a small portion of the pancreas remained glycosuria did not follow; in a later paper²¹¹_{Feb. 25} he speaks of the amount of pancreas left with success as one-sixth the normal bulk. Moreover, by the injection of disastase into the blood of an animal thus rendered glycosuric, the degree of the excretion of sugar was distinctly diminished in at least one case. Defresne,¹⁰⁰_{May 15} following up the suggestions of Lépine and others, has conducted a series of experiments upon rabbits by subjecting 6 animals to marked doses of

pancreatin after having fed them exactly as were fed 6 others as control experiments. Examination later of the blood, liver, and other organs was quite interesting. Three of the pancreatinized animals showed sugar in their urine, although there was none prior to the experiment. The blood of all the pancreatinized animals was found to contain from five to six times as much sugar as normally, and the liver but about one-fourth as much as in the normal control animals. This suggests to the experimenter that the glycosæmia and glycosuria are dependent upon the glycogen of the liver as a source, and that the transformation of the glycogen into glucose depends upon the action of the pancreatic juice. The ferment which in the liver presides over the formation of glycogen is formed in the pancreas, and is carried into the intestinal canal and resorbed in an active state at the same time with the other elements of digestion into the portal system and into the liver, where it acts upon the glycogen. The sugar formed by transformation of starchy elements of nutrition and that formed in the midst of the tissues as a product of a sort of auto-ingestion come to the liver, where the hepatic ferment normally changes them into glycogen and emmagasine. The glycogen is gradually transformed by further action of the hepatic ferment, which is dependent on the pancreatic ferment resorbed by the chylifers and carried into the liver by the portal system, and the sugar which is thus formed is carried into the circulation, where it is broken up into H_2O and CO_2 . The failure of the pancreatic juice in case of pancreatic ablation or disease entails an absence of the hepatic ferment. The glycogen which is in the liver fails of conversion into an assimilable form of sugar to be carried as such in the circulation; and the sugar from alimentation and that from autodigestion fail to be fixed in the liver as glycogen, but continue to circulate in the blood until expelled by the kidneys. From such views, it seems likely that glycosuria may be produced by very opposite conditions,—from the excessive presence of pancreatic ferment, producing an excess of glycosæmia from the glycogen in the liver; and from an absence of pancreatin, permitting the sugars to fail to become fixed as glycogen in the liver, but to be directly carried in large amounts into the circulation until excreted by the kidneys.

Hedon³_{Oct. 25} has excised the pancreas in 22 cases,—dogs,—and in each case diabetic urine was passed the day after and persisted

until death, other characteristic symptoms of diabetes mellitus also arising. He calls attention to one quite important point in this, that in animals in which the digestive function of the gland was destroyed by injections of paraffin into the canal, diabetes did not set in. Arthaud and Butte³ take exception to the views above expressed. It was at first supposed, by those who were interested in pancreatic diabetes, that there exists in the blood a diastase which is eliminated by the pancreas, and in case of destruction of this organ it accumulates and causes an excessive transformation of glycerin. However, by the injection of either vegetable diastase or macerated pancreas, these investigators did not succeed in obtaining corresponding results, and they are not disposed to accept this view; nor do they agree with the opinion of Lépine. They ligated almost all the veins of the pancreas, thus endeavoring to shut off the outpouring of any pancreatic ferment by this channel, and no glycosuria ensued. Having, however, noted that in these experimental cases there is almost always a dilatation of the hepatic arterial system, they suggest that the glycosuria may result from increase of the hepatic circulation from suppression of an important collateral circulation. They, therefore, have ligated the different branches of the celiac axis of a dog, except the hepatic artery. The animal died in three months, and sugar was invariably found in his urine. The pancreas, to the naked eye, did not seem changed, as the arterial circulation had been re-established by the mesenteric artery, which had not been ligated. A series of experiments by Remond¹⁰⁰ in this line does not, however, indicate the same success in its results, several animals out of the series having failed to show glycosuria after total extirpation of the pancreas. His logical conclusion, then, is that, although pancreatic lesions and diabetes are often associated, they may, nevertheless, exist independently of one another.

As an objection to the experiments of Mehring and Minowski, it has been charged that the glycosuria following their experiments really depended upon injury to the celiac plexus in the operation. Peiper,² before the Ninth International Medical Congress, read the results of experiments upon extirpation of the celiac plexus in rabbits. He operated upon 15 rabbits, observing careful precautions, 11 surviving the operation for three or four weeks at least. The other 4 died, partly from the ether narcosis,

partly from hæmorrhage and peritonitis. In those surviving, great emaciation followed, with no other outward symptoms. No diabetes insipidus was noted; mellituria was marked most frequently in the first days after operation, and was particularly seen in a case in which extensive resection of the splanchnic nerve was performed. In none of these cases at autopsy was there any hyperæmia of any of the abdominal organs, no atrophy of the pancreas. Acetone was found in a few of the cases, albuminuria in 2 cases. These experiments are in accord with the views of the foregoing investigators, Mehring and Minkowski, who do not believe that the celiac plexus has any special influence in the results which they obtained in producing a constant diabetes mellitus, and not merely a passing glycosuria, inasmuch as the plexus would stand the same danger of injury in a partial as in a total extirpation of the pancreas, and in their experiments partial extirpation was uniformly insufficient to produce glycosuria. The experiments of Lustig⁴⁶⁰_{May 10} bear very similar testimony to those of Peiper.

Another fact of significance is published as the result of investigations of Renzi and Reale,⁸¹_{Aug. 1} who verified the experiences of Mehring and Minkowski by 75 per cent. of their results upon extirpation of the pancreas, and who, noting the clinical relations between a disappearance of the saliva and diabetic phenomena, extirpated the salivary glands, the analogues of the pancreas, and produced an experimental form of diabetes to cause diabetes mellitus.

Commenting upon these recent views of the relations between diabetes mellitus and the pancreas, Romme¹⁶⁴_{Oct. 3} concludes somewhat as follows: From such results it must be added to the known influence of the pancreatic juice upon fats and albumens a further function, that of aiding in the combustion of the sugars, by means of a special ferment agent it possesses. Without the action of this ferment, the sugars which are obtained from the aliment, as well as those found within the economy, fail in combustion and continue unchanged in the circulation until excreted as glycosuria. This substance is carried, with the pancreatic juice, into the alimentary canal, whence it is absorbed and passes into the portal system; or it may be removed directly from the pancreas in its venous circulation, thus accounting for the failure in many cases of obstruction of the canal of Wirsung to cause diabetes mellitus.

Under the head of traumatic diabetes may be mentioned

several cases spoken of by Warren,¹⁴⁴_{Dec., '89} caused by spinal concussion: one, thrown from a carriage, striking the lumbar portion of the back on a rock; another occurring in a railway accident. Loisel²⁰⁸_{p. 146} mentions the case of a young man whose urine he had examined in October, 1889, when attending him for a slight gastric ailment, but in whose urine, when he was again called, in the following December, he found sugar. The man had fallen and struck his back, about the upper two lumbar vertebræ, causing him to remain bedfast and inducing a great loss of power and pain upon attempt to move. Within a few weeks after the accident there was a distinct amount of sugar in the urine, and, after a brief course, the case terminated, in March, 1890, by diabetic coma and death.

Ord²_{No. 1608, '90} remarks the relative frequency of glycosuria in the tertiary stages of syphilis, particularly after paroxysms of angina. Decker⁶⁰_{No. 46, '90} mentions the case of a laborer who entered the hospital for the treatment of a syphilitic retino-choroiditis and syphiloderm, and who presented a glycosuria. Treatment of the syphilitic condition by mercurial inunctions caused these various symptoms, glycosuria as well as the rest, to disappear in spite of a mixed diet.

Moritz and Prausnitz³⁹¹_{No. 37, p. 61} add a contribution to the subject of experimental glycosuria from phloridzin, confirming the results which have been noted by other observers. The resorption of this substance from the alimentary canal seems to take place quite rapidly and very thoroughly, a dose of 1 gramme (15 grains) to a dog weighing 1 kilogramme (2½ pounds) being entirely unrecognizable in the fæcal matter. The sugar excreted under the influence of this substance possesses the characteristics of glucose, and the exhibition of but small amounts is usually sufficient to induce the symptoms for several days.

Schmitz,⁴_{May 19} many years ago, had noted the fact that man and wife may both be diabetic, and up to 1880 had met with 8 such instances. From a recent analysis of 2320 cases he has accumulated in all 26 examples of such occurrence; and experience has taught him that quite healthy persons, without hereditary predisposition, may become suddenly diabetic after attending to a diabetic for a time, living in the same room, sleeping with and especially kissing him often. In the cases which came under his

notice, usually man and wife, there was no blood relationship between the persons; in none of the cases was there any appreciable cause, no excessive saccharine diet, no gouty tendency. The diabetes in these instances came on at variable periods of time, but always after an extended interval of nursing the diabetic patient; was in some of the cases but transient, in others permanent and fatal. In the light of this presentation, embodying somewhat over 1 per cent. of several thousand cases, the writer is disposed to suggest strongly the possibility of an infectious nature in diabetes mellitus. Debove, having observed similar occurrences, is rather disposed to look upon them as coincidences, man and wife existing in the same unhygienic conditions, and exposed to the same mental worry and strain.

Ord,² discussing the cause of the presence of sugar in the urine in pathological quantities, offers the opinion that the conditions determining it are (*a*) excessive afflux of arterial blood to the liver, and probably to other organs possessing a glycogenic function; (*b*) defective assimilation of glucose; (*c*) defective formation of glycogen; (*d*) instability of glycogen,—the formation of glycogen which is too easily transformed; (*e*) excessive ingestion of glucose or of glucose-yielding substances. Under the first of these heads would be classed causes such as (*a*) vasomotor paralysis from disease of the medullary centre or nerves connecting it with the arteries of the liver; (*b*) dilatation of the hepatic artery not due to such disease, but to irritation in the liver, as from alcohol, or to reflex action from other organs, as the stomach, or to general circulatory disturbance, either functional, as in nerve strain or excitement, or probably also dyscrasiæ, as in gout; (*c*) possibly also compensatory hyperæmia, due to undue contraction of the arteries in other parts of the body. The author regards diabetes mellitus as occasionally transmitted hereditarily, either as a transmission of the disease itself, or of such conditions as predispose to its occurrence, gout, nervous disorders, etc. Nearly related to the above group are those instances occurring in cases of contracted, granular kidney, Raynaud's disease, tertiary syphilis, perhaps acting as a toxic upon the liver. He has also met the disease in connection with angina pectoris, occurring, as he suggests, from arterial relaxation in the liver compensatory to the tension in the extremities. He also calls attention to the excess of lactose in the

blood during lactation, and its appearance in the urine as glucose. Raven²_{Dec. 24, '99} adds to the above the fact that he has seen several cases of transient glycosuria connected with angina, and in women weaning their babes (but only where there was pyrexia). Arnaud, in a comprehensive article¹⁶⁴_{June 2, Aug. 26, Sept. 11, Oct. 9} upon the relation of the carbohydrate ingestion to diabetes, explains the various changes these elements of nutrition undergo. The carbohydrates are ingested a large amount in relation to the other organic elements. They are changed into glucose in the digestive apparatus. Alimentary glucose is absorbed in the greater part, if not *in toto*, by the portal veins and carried in this vessel, in a form not well understood, into the liver, where it contributes to the formation of the hepatic glycogen. The nitrogenized elements or the fats may, in absence of alimentary sugar, be converted into glycogen; but it is impossible to state positively whether these elements form glycogen when the starches are present, or in what proportion they contribute to such formation. During complete fasting glycogen continues to be formed in the liver; but normally it is probable that the aliment furnishes almost all the hepatic glycogen employed in forming sugar. The liver makes sugar without cessation from the glycogen which it contains, and in a healthy person in ordinary conditions of alimentation its work is particularly invariable. This hepatic sugar is carried into the vena cava and thence into the general circulation. Here it is not known exactly what becomes of it; it, however, does undergo an appreciable destruction, the length of time it remains in the blood and the degree of rapidity of its disappearance not being known positively. It seems probable that it is broken up in the general capillary system, but whether its disappearance is into intermediate products or tissue nutrition, or whether its destruction is an evidence of its excretion, is not known, although the former view seems the more tenable. The final changes before excretion are, in all likelihood, water and carbonic-acid anhydride, although until this final degree of oxidation is attained the substances may have played several rôles in the system of nutrition.

The point of departure, according to Arnaud, in the pathogenesis of diabetes mellitus is the failure, absolute or relative, for a change of the hepatic sugar after being thrown into the circulation; its constitution of what the writer speaks of as a renal glycaemia,

in which glucose, a crystalloid body, is present in a free state in the capillaries of the renal circulation; finally, by a simple leakage giving rise to glycosuria. Hofmeister⁸⁸² recognizes these steps in the appropriation of starch by the organism: transformation into sugar, resorption, assimilation. In the exhibition of equal nutrition to the well and the diabetic there is notable a quantitative as well as a qualitative difference of result, in that in the well there is no apparent disproportion between the amount ingested and that excreted. The author has succeeded in showing that in dogs diabetes mellitus may be experimentally induced by withholding food. In some cases it was necessary to deprive the animals of food for several weeks in order to accomplish this result. The experiments show that the interruption of starvation by feeding starches is sufficient to precipitate an attack of diabetes mellitus, and that the more advanced the starvation the easier is the production of the symptoms of glycosuria. This form of the malady, brought about by inducing inanition, running over several weeks in most cases, a condition analogous to the transitory diabetes of man, is denominated starvation diabetes by the writer. The excretion of sugar is greatest toward the close of a period of starvation, and in very reduced animals may remain permanently. It is probable that here part of the sugary elements taken as food escapes assimilation, not on account of rapidity of resorption, but because of failure of the assimilative power. That the latter proposition is correct the author proves experimentally by giving to a normal and to a starved dog equal amounts of a carbohydrate and then killing the animals. It is noted in such cases that the starved animal has resorbed very much less than the normal animal.

According to Hofmeister, then, in the establishment of the malady in question, these three conditions obtain,—one of them, at least: (a) an abnormally rapid transformation of the starch ingested into sugar; (b) quickened resorption; (c) lowered assimilation. The first and second of these conditions are not evident from the above experiment,—only the third. Hirschfeld,⁸⁸⁵ Nov. 10, 11 experimenting upon five diabetics with a view of studying the conditions of resorption of albuminoid and fatty matters ingested, has determined that in at least two of these cases the resorption was decidedly diminished. Thus, in 1 case, a woman aged 44 years, robust,

weighing 44 kilogrammes (117 pounds), who had for some months been quite feeble with diarrhœa alternating with constipation, diplopia, abolition of knee-reflex, showed elimination of nitrogen in the urine reduced to 10.02 grammes ($2\frac{1}{2}$ drachms) for twenty-four hours after 19.49 grammes (5 drachms) of nitrogen had been ingested. In a control case, taking the same amount and kind of food, 17.01 grammes ($5\frac{1}{2}$ drachms) were recovered in the urine. In the other instance, a man of 45 years, weighing 65 kilogrammes (174 pounds), the elimination of nitrogen in the urine was 18.12 grammes ($4\frac{3}{4}$ drachms) for 29.98 grammes ($7\frac{3}{4}$ drachms) ingested; control experiment, 26.173 grammes ($6\frac{1}{2}$ drachms), examination of fæces showed the presence of the nitrogen which had escaped resorption; the fæcal matter was exceedingly fatty, also. The experimenter does not look upon this deficiency of resorption as due to a gastric or intestinal catarrh, but rather to a special, definite loss of function. He mentions in passing that bicarbonate of sodium in doses of 5 or 10 grammes had the effect of diminishing the weight of the fæces, and consequently of improving the conditions of absorption. He concludes that there exists a special clinical form of the disease in which the gastro-intestinal functions are gravely deranged. Lancereaux, ¹⁴ _{May 18,} ¹⁷ _{Jan. 20} in a clinical lecture upon diabetes mellitus, made use of this pathogenetic classification into three forms; (a) a traumatic form, due to lesions of the nervous system; (b) pancreatic (cachectic) diabetes; (c) obese diabetes, or herpetic diabetes. The first species, established by the researches of Claude Bernard, is that produced by puncture in the floor of the fourth ventricle; the second, that with emaciation, has been found to be connected with lesions affecting the integrity of the pancreas; the third is a constitutional disease, appearing as the result of a hereditary taint in many cases, and connected with gouty and albuminuric affections.

Morbid Anatomy and Semeiology.—Saundby, ⁹⁰ in his Bradshawe lecture on the morbid anatomy of the disease in question, takes up *seriatim* the different organs, giving a *résumé* of the subject and the results of his own observations. Out of 27 records of examination of the brain in cases of diabetes mellitus, the organ was stated to be normal in but five instances, the abnormalities consisting most frequently of œdematous brains with thickenings of the membranes. Less frequently the organ was described as anæmic, cystic, particularly in the frontal lobes, in the pons and

medulla. Careful examination with the microscope failed to indicate any histological changes, except in one instance where the capillaries of the vagus nucleus seemed to be abnormally numerous and full of blood. He cites 1 case of tumor of the cord,—a myxoma of the dura mater,—occurring in connection with diabetes mellitus. In 3 cases the semi-lunar ganglia were found enlarged, and in one case atrophied, with increase of connective tissue and atrophy of nerve-cells. In about 40 per cent. of Saundby's cases the heart was described as normal; in about an equal proportion as pale and soft, more rarely dilated or hypertrophied, or distinctly fatty. In 1 case of death from carbuncle in a diabetic, the pericardium was filled with fluid, fatty blood; valvular disease was seen but in a single case of the 29 recorded. Fatty changes in the muscular wall of the heart, in the opinion of this writer, occur in less than 40 per cent. of cases, and the glycogenic deposits which have been described have been found in such small quantity that they can scarcely have any pathological significance, in his view. In the series of post-mortem examinations, in but 17 per cent. of cases were the lungs found free from disease. The most common condition was congestion, or congestion and œdema; phthisis was noted as present in 27 per cent. Abscesses, hæmorrhagic infarcts, and gangrene were also recorded. The liver was found frequently diseased, usually enlarged, several times small, soft, and pale. The most frequent microscopic change is a fatty degeneration, often a certain degree of interstitial hepatitis and cirrhosis, beginning in the hepatic and portal areas. Out of 15 cases in which note was made of the condition of the pancreas, it was atrophied in 7 and abnormally firm or fibroid in 4, while it was normal in only 4.

In all the typical cases of emaciating diabetes Saundby found the pancreas in a shrunken state; under the microscope the organ shows an increase of connective tissue, with hyaline change of the pancreatic glandular epithelium. The stomach, in almost all of the few cases recorded, presented some slight pathological condition, as dilatation, catarrh, ecchymosis, etc. In not one of the cases met by this writer in his post-mortem examinations were the kidneys described as normal, though in many the changes were unimportant. The most common lesion seemed to be a slight fatty degeneration; the organs were slightly enlarged and the capsules

somewhat adherent. Less commonly they were enlarged and congested. The most interesting histological point met by the author in these cases is the existence of a hyaline degeneration of the tubular epithelium, as has been described by previous observers, and its limitation to Henle's tubes. Besides this there may be noted a glycogenic infiltration of the tubular epithelium and often evidences of fatty degeneration. From these general observations it cannot but be remarked the wide-spread possibilities of pathological occurrence in the disease in question. Of them probably the most important, from an etiological point of view, are the changes described in the pancreas and in the sympathetic ganglia of the abdomen.

Vanhersecke¹⁸¹_{Mar. 29} reports the appearance of the heart removed from the body of a patient dead from diabetes; there was noted considerable oedema in the cellular tissue of the organ in front and behind. It invaded the endocardium in the neighborhood of the orifices, and here and there the tissues had a gelatinous character. In this case the ordinary symptoms of diabetes were constantly absent, and although there was no albuminuria there was present wide-spread oedema in the limbs, peritoneum, pericardium, pleura, and cellular tissue of the heart. Jacques Meyer⁴¹_{Apr. 10} states that, out of 380 diabetics seen between 1879 and 1888, 82 (or 21.6 per cent.) showed cardiac enlargement. In the autopsy records of the Berlin Pathological Institute, 13 per cent. of diabetes cases showed cardiac involvement. The condition in a well-nourished patient is one of hypertrophy, which, however, readily passes into dilatation, or may sometimes pass into atrophy without any tendency to dilatation. Salomon, in the discussion of the paper of Meyer, doubted the influence of the sugar on the heart, but believed that the enlargement was due to disturbances in the pulmonary or kidney circulation. Fraenkel looked upon the hypertrophy as due to aortic sclerosis, and if the coronaries are affected it is possible that the hypertrophy gives way to atrophy.

Glynn¹⁸⁷_{Dec.} details a case of diabetes mellitus occurring in a boy aged 17 years, without history of antecedent diabetes in his family. He had been ill about six weeks before his admission to the hospital and died within two days after entrance. There was noted in this case a peculiar granular deposit in the blood-serum, and at the post-mortem examination it was observed that the blood at rest

separated into two layers, the upper having a creamy appearance, the lower the appearance of ordinary blood. The creamy layer was acted upon by alkalies, ether, etc., and blackened on contact with osmic acid. The small portion not made up of fat probably consisted of some proteid matter. Under the microscope the fat appeared as fine granular matter, not in globules of sufficient size to permit of their acting as emboli. In this case the liver and pancreas are both noted as having a normal appearance; the heart was small and flabby; the spleen normal in size, but pale. The kidneys were pale, but to the naked eye presented no other peculiarities. One or two mesenteric glands were somewhat enlarged, the follicles of the intestinal mucous membrane enlarged and numerous; Peyer's patches not injected, but swollen and having a shaven-beard appearance.

Glenard ³ _{Aug. 25, Apr. 24} ¹⁰⁰ has made an exhaustive study of the gross features presented clinically by the liver in diabetes. He claims that in 60 per cent. of diabetics there is a manifest change in the liver, usually in the right lobe. The density of the organ is increased in one-third and its sensitiveness in one-fourth of the cases. It is usually increased in size, this increase consisting of elements of induration. It seems, according to Glenard, that there takes place a sort of continued evolution, not to be distinguished from the changes met in syphilis, alcoholism, and lithæmia. Lépine, in discussing this paper, while admitting the possibility of hepatic changes as part of the morbid anatomy of diabetes mellitus, considered their establishment as due simply to the excess of aliment entering the hepatic structures. Lépine ²¹¹ _{May 11, Aug. 17} recently made an autopsy upon a case of diabetes, aged 54 years, dead twenty-four hours after entrance into the hospital, in which the pancreas seemed quite normal to the naked eye, neither diminished in size nor harder than usual. Under the microscope, however, connective-tissue bands were to be seen passing all through the glandular acini, and the writer states his belief that this circumstance is sufficient to retard the lymphatic circulation through the acini and the resorption of the glycolytic ferment.

Lemoine, ³ _{Aug.} in the discussion, spoke of a case in the service of Lannois, where the pancreas looked quite normal to the naked eye, but under the microscope showed decided sclerosis. It would appear to these persons that, while the pancreatic ferment is in part

taken up by the portal system, the greater portion is really carried by the lymphatics. Bouisson⁷ reports a case of rapidly-wasting diabetes, in the body of which at the necropsy there was found a hard, firm, pancreas, tubercular lungs, and the pancreatic duct contained several small calculi, one entirely obstructing the canal and causing the pancreatic fluid to be retained and to distend the canal back of the obstruction. Collier² records a case in which there was associated a cancer of the pancreas. The patient was a man of 48 years of age, who was first under observation in 1886, and during the early part of the observed course was very pale and somewhat dyspeptic, and sometimes complained of intense abdominal pain after eating. Toward the close of the case the patient presented a very rapid emaciation. At the post-mortem examination a cancer of the head of the pancreas was discovered, invading by contact the posterior wall of the stomach. Sugar had been constantly present in the urine early in the case, but under appropriate diet could be prevented from manifesting itself.

Fichtner⁸²⁸ noted in 2 cases dying in coma a fatty change in the cortex of the kidneys, the oil occupying exclusively the cell-body. In none of 4 post-mortem examinations, made upon diabetics by this writer, did he notice the foci of necrosis described by Ebstein, but found that invariably the loops of Henle were infiltrated with glycogenic matter. In a case not dying in coma there could not be found a trace of any typical change in the kidney, and the writer is disposed to regard fatty change of the cortex as more or less characteristic of diabetic coma.

From a clinical point of view, Gans⁴ has contributed a valuable study of the gastric functions in diabetes mellitus, and states that the gastric secretion varies greatly in each case, and in fact in the same individual. In all the 10 cases examined the gastric movements were normal; nor could the observer make out any relation between the gastric function and the amount of sugar in the urine, or the severity or duration of the disease. As to the hydrochloric acid in the stomach secretion in these cases, there was noted in some cases total absence, in some a normal amount or even a hypersecretion.

In a similar paper by Rosenstein⁴ it is stated that, in a series of cases of the malady under consideration, free hydrochloric acid was absent from the gastric juice for a greater or less length of

time,—this to be considered as the expression of a gastric neurosis. In a number of these cases there was a demonstrable diffuse atrophy of the gastric mucous membrane upon post-mortem examination, depending upon an interstitial gastritis. Where free muriatic acid was continuously absent,—not simply for a greater or less interval,—it is probable that the reason is to be sought in atrophy of the gastric glands. The temporary absences, the evidences of neurosis, are, no more than the absence of the patellar reflex, a further evidence of the same, to be regarded as bearing any proportion to the gravity of the case.

In continuation of the observations of the foregoing investigators, Honigmann⁶⁹ details the results of like examinations of 7 diabetics in Riegel's wards at Giessen since 1886. The amount of muriatic acid free in the gastric secretion was normal in only 1 case; in 3 there was hyperacidity, in 2 absolute deficiency, and in 1 a varying amount. Honigmann looks upon the hyperacidity as due to the polyphagia, and not the cause of it. In all these cases the disease was recent. He does not think that in the cases showing diminished secretion there was any evidence of organic disease of the stomach, as atrophy of the mucosa or gastric catarrh. He found no diminution in the muscular activity of the stomach-wall; the opposite, in fact, is suggested as a cause for the diminished amount, the food being too quickly discharged into the intestines.

Pommeroff,⁶ denies the statements that have been made by Heller and Frick, that in diabetes the gastric juice contains sugar. He states that in the gastric juice obtained by vomiting there is usually some biliary matter, the bile ordinarily containing sugar. When the gastric juice is obtained by the œsophageal tube there is no biliary admixture and no sugar can be detected.

Under the term "miliaria with dermatitis varicelliformis diabetica," Günz²⁹⁷ describes an eczema in diabetics, marked by the formation of blebs and blisters, and proceeding to a condition of furunculosis. Wiedner,⁴¹ mentions a case occurring in a man of 50 years, in whom the disease could not have been very well marked, as no physician had been consulted until within five days of death. There was present a wide-spread petechial eruption, appearing in the skin, just as in Werlhoff's disease. Wiedner, who cannot find an analogue in medical literature for this compli-

cation or symptom, examined the urine and found a large proportion of sugar present.

Boichox²¹⁹_{Jan. 1, '90} calls attention to a number of cases of a rather stubborn form of diabetes mellitus found in gouty persons, which is peculiar only in its being marked by slight muscular tire, indisposition to move, and a slight feeling of thirst, lasting for a few days. During this period the urine contained considerable sugar, but uric acid was absent. The liver in such cases is always increased in size. Under medication with alkaline waters, as those of Contrexéville, the sugar is apt to disappear from the urine, uric acid reappears, and the liver decreases in size. Patients do not seem to be in special danger from this form of glycosuria, although they show but little resistive power, and readily succumb to other and intercurrent affections.

A case presenting a marked intermitting tendency is published by Stai⁸⁷_{Apr. 20} in a woman of 50 years, following dengue fever. The urine contained at frequent and rather long intervals quantities of sugar varying between traces and 50 grammes (1½ ounces) per litre (quart). The quantity of urine passed was rarely above 1 litre (1 quart) for twenty-four hours, and, beyond the presence of sugar, the other elements were normal. The specific gravity was generally 1018; on a single occasion it reached 1027. The diet seemed to have no effect whatever on the amount of sugar excreted.

A case of diabetes is reported by Charteris⁶_{May 21} in a woman, aged 45 years, who was passing as much as 320 fluidounces (18,928 cubic centimetres) of urine daily, containing 20 grains (1.30 grammes) of glucose to the ounce (31 grammes). Fichtner³²⁸_{B. 46, H. 1, 2}⁵⁵ in a diabetic girl aged 10 years, observed, among other symptoms, abolition of knee-reflex and a diffuse retinitis. The urine, which contained 6 per cent. of sugar, gave the acetone reaction, but did not show any oxybutyric acid. A second case showed the peculiarity that the urine, when exposed to the air, became of a rose color, the color not being due to any blood-pigment.

Complications.—Peripheral neuritis has taken a prominent place among the nervous phenomena of diabetes, and the following cases are, therefore, of special interest. Althaus⁶_{Mar. 1} reports a case of neuritis of the circumflex nerve of the right arm occurring in a man of 56 years, for eight years a diabetic, with but slight

symptoms. The neuritis came on suddenly in the night, without previous exposure, and continued for three weeks as an intensely painful affection, worse at night, the pain of a stabbing or boring nature, and the arm very sensitive to the touch. When the pain finally stopped, the patient could not raise his arm, and the deltoid muscle was found in a palsied state, with rapid wasting of the shoulder perceptible. Electrical tests of the muscle indicated degeneration; electrical treatment was without results until other treatment was instituted. After treatment by codeia, careful but not absolutely restricted diet, and faradization of the skin, the functions of the arm were restored after two and one-half months, but the muscles were still without the proper electrical reaction. Buzzard⁶, also speaks of a case of peripheral neuritis, of paraplegic form, in the course of a case of diabetes mellitus.

Charcot⁸⁴ ²⁷⁸_{May 5, July} exhibited before his clinic a baker, aged 37 years, with marked neurotic family history, of good habits, who had been losing strength for about three years, and had been known to be diabetic for nearly two years, and most of the time without treatment because of poverty. He complained of lightning pains in the lower extremities, formications in the hands and feet, and sensations, sometimes of cold, sometimes of heat, in the feet. There was slight incontinence of urine; no control over sphincter ani. The patellar reflex was absent, and when standing with eyes closed the patient swayed. Sensibility to touch and pain normal; walk hesitating and uncertain, but not ataxic, with feet raised high on account of extensor palsy. No muscular atrophy could be clearly demonstrated; but the electrical reaction of degeneration was manifested in the muscles of the anterior portion of the leg, with diminished electrical excitability of the other muscles of the leg and thigh. There were no cerebral symptoms. Charcot decided the case to be one of peripheral neuritis, due to diabetes mellitus; and after a few months' treatment the glycosuria had greatly lessened, as well as all of the nervous symptoms except that of excessive heat sensation. Bruns, of Hanover,⁴ in writing of the nervous palsies of diabetes mellitus, recounts several interesting cases. The first, in April, 1889, showed a beginning motor-trophic palsy in the distribution of the left crural nerve, starting with neuralgic pains in the left ileo-psoas and quadriceps femoris and obturator muscles. There were evidences of degeneration in the

quadriceps. There was no anæsthesia; nor were there other symptoms beyond the glycosuria (5.5 per cent.). After an antidiabetic diet rapid disappearance of the glycosuria ensued, with a simultaneous improvement of the neuralgic symptoms and a gradual but perceptible improvement in the palsy, so continuous that in seven months the patellar reflex had returned; in a second case, a similar train of symptoms affecting the distribution of the left crural and obturator nerves. A similar palsy had been noted previously in the right leg, but had disappeared. Diet failed to have effect upon the excretion of sugar, but the neuralgia, atrophy, and palsy improved and the patellar reflex returned. Later, when a slight increase in the proportion of sugar occurred, the pains rapidly returned. In a third case, in the left leg, there were noted severe neuralgic pains, and at the same time a slight paresis of the left crural nerve. While under observation, the affection shifted to the right leg, and here gave rise to intense pain in the quadriceps and ileo-psoas, with wasting and change in the electrical reaction. The sugar percentage was never much, but twice the neuralgias increased and improved with a parallel in the glycosuria. The palsy and atrophy in the right leg diminished, however, as the glycosuria increased again.

Salomonson⁴¹_{Nov. 13} mentions a case of a young woman, aged 18 years, who presented a total absence of the knee-jerk, without any evidence of tabes. Bazy²⁴⁹_{Nov. 17} before the Congress of Surgery in Paris, called attention to the diminution or even absence of patellar reflex in cases of diabetes, to a mental condition which often simulates melancholia, etc., and to the frequent evidences of vesical irritation. Caliari⁵⁸⁴_{Mar.} mentions a man of 51 years of age, who had noticed an increased appetite, a constant thirst, increased excretion of urine, and who was suddenly seized with epileptiform convulsions of the lower jaw, occlusion of the eyelids, wrinkling of the brow, and extension of the labial commissures. The urine contained 34 grammes ($1\frac{5}{8}$ ounces) of glucose to the litre (quart). Some days later the convulsions extended to the arms, beginning with distinct aura, lasting from two to eight minutes, and leaving a slight, transient palsy of the arms. The intelligence was intact. As many as thirty-five of these convulsive seizures occurred in a day. Bromides, antipyrin, baths, morphia, and atropia were all employed without effect, and the patient passed from observation uncured.

Fournier³⁵_{Jan. 23} reports a case of a diabetic woman who was affected with glossitis and had a superficial abscess of the tongue, which he regards as due to the diabetic state. Partsch³⁴_{Nov. 18} mentions an interesting case of a diabetic who developed a spontaneous gangrene of the toes, which, however, under antidiabetic and locally antiseptic treatment, was cured, only to appear again in more marked degree. At this stage, with increased sugar percentage in the urine, there occurred peculiar attacks of collapse, with somewhat diminished amount of urinary excretion, small pulse, consciousness intact, cyanosis of skin and mucous membranes, and some bleeding. In one of these attacks the patient died. Microscopically there were extensive vascular changes in the gangrenous toes, consisting essentially of endarteritis with diminution of lumen and calcification in the middle coat. These changes were especially to be seen in the small arteries, and are rarely mentioned in connection with the disease in question, although they play an important part in determining the occurrence of gangrene, for which, in reality, the sugar in the tissues is not directly responsible. The writer does not lay stress upon the usual injunction to amputate high up in these cases of gangrene of the extremities in diabetes, but insists that the general condition, the degree of sugar excretion, and the local conditions must be taken into consideration. A case of gangrene, the disease occurring in the feet and on the right leg above the ankle, in a diabetic woman aged 60 years, is described by a writer.³⁰⁶_{July} The arteries in this case were widely calcified, and no operation was performed on account of the moribund condition of the patient. No autopsy was obtained after death, which occurred in coma.

Gaston Lyon,⁴⁵⁶ in studying the development of diabetic coma, refers it not so much to the condition acetonæmia as to the deprivation of the blood of certain salts, especially soda-salts. These alkaline salts have an especial function in the blood of carrying off the CO₂ developed in the system. In the diabetic state there are certain acids—diacetic, oxybutyric, crotonic, and formic—which in their excretion are combined with alkaline bases. The combination between these and ammoniacal substances is the most facile and most complete where the patient from an animal diet furnishes the largest proportion of ammonia for the combination. When the ammonia fails, however, to be present in sufficient

amount to carry off these acids, they combine with the soda in the blood, and thus deprive this fluid of a most important respiratory agent. Eventually, because of this deprivation, carbonic-acid accumulation brings about the coma; the dyspnœa of diabetics, too, may be readily accounted for by this idea—a dyspnœa without orthopnœa. This new theory has necessarily suggested a change in treatment to the extent of the free use of carbonate of soda, both by the mouth and by intra-venous injections in conjunction with sodium chloride; and although the results of this treatment have been unsatisfactory as a rule, the report of cases presently to be noticed bears strongly in support of the correctness of the theory.

Schmitz⁴ recognizes two causes for diabetic coma—weakness of the heart, caused by action of sugar on the heart-muscle, and, secondly, an auto-intoxication, which has improperly been called acetonæmia. The first of these produces collapse, with coma; the second, diabetic coma proper. The treatment of the first is prophylactic or active, according to circumstances. Before the collapse, exertion and cardiac depressants are to be avoided and cardiac stimulants administered; and during the attack the utmost stimulation is to be practiced. In true coma, both prophylactic and active treatment is to be directed to the elimination of the toxic cause, which Schmitz believes accumulates in the intestines. He hence advises castor-oil to be given freely, even if diarrhœa be already present. He states that he has had excellent results from this method of procedure.

In the list of diabetic comatose occurrences the following case should probably be included. Love² reports the history of a man, aged 43 years, admitted to the Glasgow Western Infirmary on January 15, 1889, sick apparently for about nine months, during which time he rapidly lost flesh and developed polyuria, polydipsia, excessive appetite, and great weakness. He denied all excesses, injury of any import, and history of diabetes, nervous disorders, and phthisical tendency in his family. He gradually grew worse, constipation becoming a serious feature. On January 29, 1889, he seemed in the morning slightly confused and stupid; at 10 P.M. he was found in an epileptiform fit, lasting two and one-half minutes, followed by sleep, from which he was aroused, and he then talked rationally. Fifteen minutes later another convulsion occurred, the whole body being affected; unconsciousness was

profound and breathing stertorous. This was followed by a brief sleep and a short but furious mania, and then another fit. During the night, at intervals of less than fifteen minutes, these convulsions recurred, and toward morning the patient passed into a profoundly comatose condition, and thence into death. Convulsions in the last stages of diabetes are by no means common in the total number of patients. Dreschfeld, in his Bradshawe lecture, stated that in 16 cases he had witnessed but one presenting convulsive attacks, and out of 80 cases he had collected but 6 instances.

Dickinson⁶ reports a case of diabetic coma, in which he obtained temporary benefit by the injection of a saline solution. The patient, a young woman aged 25 years, had had a diabetes of severe character, and had developed a coma of the ordinary type. He injected slowly into the veins of the right and then of the left arm 106 fluidounces (3136 cubic centimetres) of a saline solution containing sodium chloride, potassium chloride, sodium phosphate, sodium sulphate, and sodium bicarbonate dissolved in water—the same as is used in cholera for transfusion. In about ten minutes after the injection the woman's consciousness re-appeared and gradually returned until the next day, during which time she conversed and ate naturally, when the coma came on again. A vein of the leg was opened and the fluid injected from an elevated funnel. Under treatment the pinched aspect of the face improved, the complexion became less livid, and the pulse gained in volume. Consciousness did not immediately re-appear, although 350 fluidounces (10,351 cubic centimetres) of fluid were injected. The patient remained in coma for about fifteen minutes after the operation, then regained complete consciousness and retained it without drowsiness for nine hours—in all, with slight lapses, for thirty hours; then coma returned again, with fatal issue. The urine then was thin, of a specific gravity of 1012, and contained 1.8 per cent. of sugar, but no acetone, although this had been marked at first. The bowels became slightly loose, the skin moist. Within thirty-two hours 22 imperial pints (11 litres) of fluid had been injected into the patient's circulation. After death the body weighed 93 pounds; five days before the injection, 81½ pounds, the increase being probably due to the water introduced. The blood after death was fluid. Dickinson suggests, because of the lapse of time between the injection and the recovery of consciousness, that

the result was due to elimination, and not to the simple hydration, and thinks that, as a preventive measure, free use of water before the development of coma might have some effect in retarding its appearance. Chadbourne,⁵⁹ records a case of diabetic coma in which intra-venous injection of saline solution was practiced. Thirty fluidounces (930 grammes) of a 5-per-cent. solution of sodium bicarbonate were injected into the median cephalic vein; the pulse-rate fell and the patient regained consciousness. Next day the coma re-appeared, and the same injection was followed by a similar result, but only temporarily. The friends refused the third injection, and death quickly occurred.

Mitchell⁵⁸ publishes a case of diabetic coma, beginning with gastro-intestinal symptoms like those of cholera morbus, followed by epileptic convulsions, coma, and death. Lancereaux,^{17 14 39} in considering these systemic complications of diabetes, groups them under the one term, acetonæmia. In his classification he recognizes a muscular form, a gastro-enteric form, dyspnœic form, cardiac form, and a cerebral or comatose form. These manifestations of the same general state may present themselves alternately in the same case, or possibly several of them together, or pass from one into another and into death. The muscular form is characterized by extreme languor, painful points in the muscular masses, and a sensation of suffering upon motion. There is a presentiment of approaching death, and there is apt to be a lowering of the temperature coincident in general with a diminution of the quantity of urine. These symptoms persist for a time, when they disappear or suddenly increase, or become complicated with the other manifestations of acetonæmia. The second form is apt to be preceded by languor and malaise, and is marked by persistent nausea and vomiting, occurring in periods. In some cases there is apt to be a liquid diarrhœa, preceded or accompanied by a notable diminution in the secretion of urine. In other cases there is an obstinate constipation. The diarrhœa probably is a favorable occurrence, aiding in the elimination of the offending substances from the system. The dyspnœic form is characterized by a painful sense of oppression and difficulty in respiration. It is apt to come on suddenly; respiration is rapid, shallow, and regular, and there is a short, dry cough. It may last a variable time and disappear, or may be associated with the cardiac form or coma. The cardiac

form manifests itself by rapidity and smallness of the pulse, cold extremities, sense of exhaustion. The case may terminate favorably for the single attack, but if it persist the heart grows more and more feeble, heart-clots form, and death ensues. The cerebral or comatose form is the most common; it comes on suddenly, or follows one or other of the forms mentioned. It is apt to be preceded by weariness and fatigue. The attack may be represented by an intense headache, by convulsive disorders, delirium, or coma, the latter existing from the first or following either of the others. Lancereaux compares this condition to uræmia, to which it bears considerable similarity in its action and manifestations.

Schmitz ⁴_{Jan} calls attention to the production of a cystitis as a complication of diabetes, from the presence in the bladder of a urine which acts as an irritant to the mucous membrane because of fermentative changes. He recognizes three grades, differing in degree of inflammatory and fermentative occurrence. He recommends, in the treatment of this condition, washing out with a warm, saturated solution of sodium salicylate.

Savage ²_{Nov. 17} endeavors to establish a relationship between diabetes and insanity. He concludes that diabetes may arise from local brain disease or injury, and that similar conditions might give rise to insanity; that similar bodily conditions might give rise to both diabetes and insanity; that in insanity proper diabetes is uncommon; that diabetes and insanity run together in the same families. Rosenbach ⁶⁹_{July 24} is of the opinion that while, perhaps, sometimes sugar excretion may follow psychical disturbance, the condition is a rare one, the fallacy in reported cases existing in the fact that the patient's own statements are taken as to his physical health before the mental manifestations.

West ⁶_{Nov. 3, '98} has observed a man aged 49 years who presented, besides the symptoms of diabetes mellitus, the appearance of a case of Addison's disease. Upon post-mortem examination the adrenals were fibrous and adherent to the neighboring structures. On microscopical examination no trace of their parenchyma could be made out. Kühn, ³⁷_{June} in an article upon diseases of the ear in diabetes, remarks the general idea of the rarity of aural affections in the course of this disease. This is a mistake; the various inflammatory and necrotic changes in the ear should always be reviewed in relation to possible diabetic causation. He gives several cases

of diabetic osteitis. The second case was examined in relation to the nature of the micro-organisms present; these were found to be the ordinary suppurative cocci. In the first case the osteitis of the ear had occurred in a case of some standing; in the second it might be asked whether the diabetes mellitus was not a consequence of the aural disease, inasmuch as it occurred before glycosuria was detected. Körner³²⁸_{No. 28} details a case of similar character. A man of 47 years of age, after a cold in his head, complained of severe pain on the right side of his face and head. These localized themselves about the ear and back of it, increasing in severity and causing an incision of the tympanum to be performed. Large quantities of pus were evacuated and the pain diminished, but did not completely disappear. The pain returning in severity after some time, and the milder measures failing, the urine was examined and sugar discovered present. On antidiabetic diet the general health improved rapidly, and the mastoid sinuses were opened, the whole pus-cavity well washed, and the wound healed without difficulty.

Prognosis.—The influence of age upon the course of this disease is well seen in the cases reported by Ayton,⁵⁸₂ occurring in patients respectively aged 14 and 28 years, both failing to show evidence of decrease in the sugar separation under dietetic and medicinal treatment and dying within a short while. Two others, aged 45 and over 50 years respectively, improved rapidly, the sugar totally disappearing from the urine of one and being very much diminished in the other; both regained apparently excellent health.

As to the occurrence of the disease in the young, Rachford¹_{Dec. 7, '99} reports a case of diabetes in a female child less than 6 years old, fatal within three months after the first symptoms were noted. De Bary¹⁵⁸_{B. 11, B. 4} reports a case occurring in a girl of 13 years of age, terminating in about one and a half years. She possessed good family history, had easily passed through the ordinary children's diseases, and was well until in her thirteenth year, when an attack of typhus with prolonged convalescence supervened. On section the liver was found enlarged and engorged with blood, the pancreas enlarged and distinctly hard, the lungs tubercular, heart flabby. Kidney-pelvis distended, mesenteric glands enlarged, and the gastric mucous membrane injected. Kühl,³⁷²₁₈₈₁ in considering the occurrence of this disease in children, calls attention to the probably

greater etiological influence of heredity in this class than in adults; and states that, while in adults the disease is most frequent in the male sex, in the young the females are more frequently affected than males. Inasmuch as diabetes is a disease of tissue metabolism, and as early life is marked by a more rapid series of tissue changes than adult life, the course of the disease is decidedly more swift in young patients, and is almost always quickly fatal. In children there are the two forms, both of which eventuate fatally, the mild or slow and the severe. The latter is usually seen among the poorer classes, the patients of more favored circles receiving more and earlier medical attention. One characteristic of the disease in the young which is to be constantly met is the relatively large proportion of sugar in the urine.

As to the influence exerted by the diabetic state upon the prognosis of operative measures, Trousseau²⁴ states that, out of 100 operations upon the eye in glycosurics in hospital service, he had but a single fatal result, which occurred in an aged patient shortly after an extraction of a lens, taking place by a suddenly developing pneumonia. There were a few instances of slowed union, but, taken all in all, these accidents were quite insignificant; and the author urges that the fear of operation in these cases is ill-founded, and that the only precaution to be observed is that of the strictest antisepticism.

Transient Glycosuria.—Warren,¹ in considering the subject of transient alimentary glycosuria and its bearings upon life-assurance, states that in his experience, where sugar may be determined present in urines the specific gravity of which is 1025 or less, it is almost invariably transient—provided the low specific gravity has not been induced by large draughts of water just before urinary excretion. In such cases, where there are no other evidences of diabetes mellitus and the sugar disappears after a time, he considers the individuals as safe risks for assurance, inasmuch as in his experience there is naught to prove that such transient glycosuria eventuates in the severer diseases.

Goodhart,² in treating of the clinical points of transient glycosuria, comments upon the frequency of its occurrence in connection with neurotic symptoms and the gouty diathesis. He mentions 10 cases where there was every evidence of a neurotic character of the individual cases, and in which the glycosuria was

present or prominent during periods of excessive nervousness, or after periods of great mental strain. In comparing the glycosuria with the gouty tendency with which it is sometimes associated or alternates, he suggests that both are of the nature of a paroxysmal neurosis, functional in character. The relations between the transient form and true diabetes suggest other paroxysmal features, with pathological conditions due to their continuance, as in the cardiac palpitation in various cardiac affections, in the blush from natural causes and that more or less permanent in women with sexual functional failures or in exophthalmic goitre. On this ground he urges the value of such nervous tonics as strychnia, such nervous sedatives as opium and possibly antipyrin, which has proved of such value in other paroxysmal affections. A case bearing out the views of Goodhart is mentioned by Ewens,²_{Jan. 11} in a young man subject to fits of mental depression and nervousness, especially when home and business affairs, causing the excessive worry, occurred. Removal from his surroundings led to his apparent cure within several years.

Treatment.—The management of a case of diabetes mellitus must be based, briefly, according to Pavy,²_{Aug. 16} upon the fact that in this disease there occurs, as a consequence of the ingestion of carbohydrates, a failure of proper transformation or assimilation, an accumulation of sugar in the blood and its excretion in the urine. Accumulation of sugar in the blood leads to the production of symptoms varying in severity in proportion to the deviation from the natural presence of sugar in the circulation. The object of treatment is, in these cases, to reduce this deviation as far as possible; best, if possible, by restoring the transforming or assimilative powers of the system; but, in failure of such measures, to withhold by diet the ingestion of sugar-forming substances. So long as the blood is kept relatively free from sugar the untoward effects of the disease are held in abeyance, and may possibly be averted. Of the agents of a medicinal nature, opium and its derivatives, codeine and morphia, are most valuable in this direction, especially in those cases where diet fails to complete the removal of the sugar from the urine. These measures are, of course, in themselves of but temporary effect, but not infrequently the temporary withdrawal of the offending substance from the system permits actual cure to occur from the natural reparative powers. Seegen⁴¹_{Aug. 16} believes that sugar is found in the liver, but

not directly from the glycogen. He holds that the liver can form sugar from the fats and albuminoids, which sugar in health is utilized in the production of heat and energy. Distinguishing two forms of diabetes, the mild and the severe, this writer holds that one form arises from the carbohydrates ingested, owing to the failure of the liver-cells to transform them into glycogen, and that in the other sugar may still be found, although no carbohydrates enter the system. In either case there never can take place a real cure in the sense that the patient may partake with impunity, as may the healthy, of an excess of starchy foods. He looks upon the dietetic as the principal treatment, but does not insist upon absolute meat diet, as it is not always well tolerated. Alkaline waters seem, however, to increase this tolerance.

Dujardin-Beaumetz, both before the last Medical Congress in Berlin and before his class, ⁸¹_{Aug. 7}, ⁸⁴_{Sept. 12, 90} states his belief in the inseparability of glycosuria and diabetes mellitus. He recognizes three forms of the disease: a mild one, responding, in a few weeks, to antidiabetic diet; an intermediate one, in which, in spite of every effort, the sugar never entirely disappears from the urine; and a severe form, in which treatment accomplishes but little, if any, difference in the sugary excretion. He points out three interesting facts in connection with diabetes: the great difficulty in producing glycosuria from ingestion of carbohydrates, the failure to increase the sugary excretion by diet in a diabetic above a certain point, and the re-appearance of sugar in the diabetic's urine even under the strictest antidiabetic diet. He regards the dietetic treatment as the most important; and, while recognizing the value of the fatty and meat diet of Cantani, he does not insist upon an absolute fatty diet, as does this author. He permits a small amount of bread, preferably crust. He forbids all fruits and milk because of the sugar in these substances. Alcoholic liquors and strong wines are prohibited, as well as malt beverages. Only wine diluted with water may be allowed. He recommends the use of tea and coffee, and the use of saccharine as a means of improving the dietary. He does not believe that a diabetic patient should be kept for months and years steadily upon antidiabetic diet, but that the treatment should be strict in this respect only during the first two or three months, and that, as soon as the sugar is considerably diminished, rigidity should be relaxed. Moderate gymnastics,

especially in the open air, are also commended. In many cases alkalies, as the carbonate of lithium and arsenic, are of good service.

Following the line of research already outlined, Lépine²¹¹_{Feb. 10} administered to the dogs from which the pancreas had been removed in his experiments (*vide supra*) pancreatin by intra-venous injection; although at first unsuccessful, later efforts were followed by distinct diminution of the glycæmia and glycosuria. Fanconneau⁷⁸_{May 21} confirms the views of Lépine and Defresne in the exhibition of pancreatin in the wasting form of diabetes, two successful cases being cited. Lannois,²¹¹_{Apr. 30} from the same basis, has administered pilocarpine, a drug having a decided stimulating effect upon the salivary function, with a view of stimulating the analogue of the salivary glands, the pancreas. The experiment showed a temporary diminution in the glycosuria after each injection of the drug. Lépine had tried this remedy in 2 cases, but without result; he looked upon his cases, however, as having the pancreas probably too much diseased to respond to the stimulation, the pancreas in the case of Lannois not having been, perhaps, very greatly changed. Were this view true, it is possible that in this drug there is a means of estimating the degree of change in the pancreas, in the wasting form of diabetes mellitus.

Phosphorus is mentioned by Early¹⁴⁴_{Dec.} as having had excellent results in a case of diabetes following spinal concussion, along with strychnia and other agents internally, and the application of counter-irritation to the injured spinal locality; it has also produced excellent results in the hands of Squire¹⁶¹_{Jan.} in a case of long standing, given in oil in $\frac{1}{80}$ grain (0.002 gramme) doses, Casarelli²⁴_{Apr. 30} reports the following results from sulphonal: Sulphonal exercises a favorable influence upon diabetes, diminishing the glycosuria and polyuria, as well as the polydipsia. This improvement manifests itself to a degree slightly pronounced after 0.5 gramme ($7\frac{1}{2}$ grains) per day, but is more marked after several days' treatment with 3 grammes (46 grains) per day. In continued treatment with two doses of 2 grammes (31 grains) each a day the drug does not produce any troublesome secondary effects, although in larger doses it may induce somnolence and vertigo, when, however, it is sufficient to withhold the remedy for a time. The favorable influence of the medicament is seen equally well with absolute meat diet or

a mixed one. Antipyrin has not, in this investigator's experience, proved so successful.

Jambul, in the hands of Gräser,³¹⁹_{Nov. 20, '99} in the treatment of experimental diabetes, induced in dogs by the administration of phloridzin, greatly diminished the sugary excretion. The drug did not seem to have any toxic effect, in whatever dose given. The maximum dose given was 18 grammes ($4\frac{1}{2}$ drachms); the minimum, 6. Egasse,⁹⁷_{Aug. 25} declares that the best results from this drug are obtained in the form of medium intensity, where the sugar does not exceed 8 to 10 grammes (2 to $2\frac{1}{2}$ drachms) to the litre of urine. He prefers the seeds, which may be given in powder, in doses of 5 to 8 grains (0.32 to 0.52 gramme), three or four times a day. Its action is probably largely in the intestines, preventing saccharification, but it seems also to have some action upon the vasomotor centres similar to that of the bromides.

Among dosimetric practitioners, strychnia, preferably in the form of the arseniate, is lauded by Burggraefe¹²⁹_{Nov. 1, '99} and Coleman.²²⁹_{Jan.} Arseniate of soda (0.002 gramme) is reported by Galliard,¹⁵²_{June 10} to have produced very favorable effects in a diabetic girl of 10 years of age. Roschinin,⁷⁶⁰_{May 21} reports that the injection of spermine (Brown-Séquard's Elixir) relieved very decidedly the glycosuria in several diabetics, one of them himself. Benson,¹⁹¹_{July} after commenting upon the excellent results obtained in the Winnipeg district from "pemican" (dried buffalo-meat) as an article of the diabetic dietary, relates a case in which he obtained, from careful diet and the use of lithiated extract of hydrangea, an apparent cure. Cerna,⁹_{July} reports for Valdes 2 cases of diabetes in whom excellent results were obtained by the administration of iodoform in one and iodol in the other. Cerna also states that he has seen distinct diminution of the glycosuria of diabetes from the use of iodol. Poulet,⁹⁷_{Oct. 2} records 2 cases in whom, with appropriate diet, the administration of hippurate of lime in saturated solution (1 to 3 fluidrachms—4 to 11 cubic centimetres) caused decided diminution of the glycosuria in the one and total disappearance of this feature in the second. Laurens,⁹⁷_{Oct. 20} reports a cure, thus far maintained for six months, obtained by the subcutaneous injection of ergotin and the use of alkalies, without any special dietary precautions.

Troye,³⁶⁵_{Nov. 9} experimenting in Naunyn's wards at Königsberg, has sought whether increase of sugar in the food up to a certain

amount would be followed by excretion of sugar beyond that amount. After careful experiments, lasting several years, the writer decides in the negative as to this question. There may be brief periods of apparent exception, but in the long run the results are as stated. It was also found, in these experiments, that the assimilative power of the system in diabetes is really lowered by the persistent exhibition of dextrose. As to the exclusive flesh diet, barring a few nervous symptoms, loss of weight, and an increase in the ferric-chloride reaction, this diet is usually well borne and may be given for months at a time without difficulty. Naunyn ²¹¹_{Apr. 23} urges that it be not forgotten, in the dietetic management of diabetes, that all the functions are being more or less overwhelmed by the sugar in the system, and that it is not well to push too strictly any one form of diet. By taking off some of the functional burden the resistive power of the organs against the sugar may be strengthened, perhaps even more than temporarily. For this reason, meat no more than bread should be urged to extreme limits in these cases. He recognizes three varieties—a mild, intermediate, and a severe form, depending upon the amount of sugar excreted under similar amounts of carbohydrate ingestion. In his article, the author furnishes the minutest details as to diet in each of these forms. Remond, ¹⁰⁰_{Sept. 16, '91} while acknowledging the principles of a moderately-mixed diet, objects to the classification and its inutility as an exact indication for treatment. Kalley ¹⁹¹_{Mar. Apr. May} extols the value of the Carlsbad regimen and water upon diabetes, claiming that in simple cases a decided lowering of the excessive water excretion as well as sugar excretion follows. Crenshaw ¹_{July} commends the use of Waukesha Spring water where an alkaline water is demanded in the treatment of the disease. A number of the papers referred to in this article deal with the details of the diet-sheet in this disease, these however presenting no specially new features other than have been outlined. Among these are to be mentioned the papers of Pavy, Dujardin-Beaumetz, Seegen, Naunyn, Smith, ⁷⁶⁰_{Mar. 5} Duhomme, ³⁴⁵_{Apr.} and Atkinson. ⁸¹_{Nov.}

Among the newer articles of diet, Dujardin-Beaumetz (*vide supra*) recommends the use of bread made from the "soya" bean (*Soya hispida*). It is a leguminous fruit, native to China and Japan; its meal is very rich in nitrogenous substances and the amount of starchy and saccharine substances very small.

FEVERS.

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ASSISTED BY

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THE journal contributions to this department of pathology were, during the year 1890, very numerous. Vexed questions of etiology and treatment have been discussed with renewed vigor. The pandemic influenza of 1889-90 has, for obvious reasons, excited the interest and occupied the attention of medical writers and teachers to a great extent throughout the year.

INFLUENZA.

The outbreak of 1889-90, the first pandemic since that of 1847-48, had already been noted in the journals of the latter part of 1888. As pointed out in the last ANNUAL, numerous outbreaks of febrile disorders, not easily classified, had appeared in various sections during the latter part of 1889. Many of these, doubtless, were instances of epidemic influenza, the true nature of which was not at first recognized.

The disease has been popularly described during the present wide-spread and prolonged epidemic under the designation *la grippe*. Like most of its great predecessors, it came from the East. Its prevalence was first recognized in Bokhara,² in May, 1889. Europeans were first seized, after that the natives, and by July half the population of Bokhara had succumbed to the epidemic, which continued until August. It advanced from Bokhara by two routes,—eastward and westward. It showed itself by the 1st of October at Viatka, and toward the 11th of October at St. Petersburg. On the other hand, on the 16th of October it prevailed at Tomsk and throughout Siberia. From St. Petersburg it spread to Moscow. It appeared in Berlin,⁹⁹ in November; in Hamburg about the 1st of December; in Leipzig about December the 10th;

in Cologne, December the 1st; in Paris, November the 26th; in Wurtzburg and Munich it began about the middle of December; in Vienna, December 12th; Pesth, December 16th; Belgrade, December 16th; Bucharest and Sophia, December 24th. Proceeding from Paris, it began in Brussels December 12th; in Antwerp, December 16th. The first cases in London occurred at the end of December; in Madrid, December 14th; at Malaga, December 12th; Lisbon, December 21st; Alexandria, December 25th; in Algeria, December 31st; Capetown, the first week in January.

Heyfelder affirms that the picture of the disease at Bokhara, as well as that at St. Petersburg and Moscow, was identical with that seen in an epidemic of dengue which prevailed the previous year in Greece and at Constantinople. ⁸
Jan. 29

Isolated cases showed themselves in New York and Philadelphia about the middle of December, and the disease became epidemic on the Atlantic sea-board during the last week in December. Thence it spread rapidly throughout the United States. It prevailed in Mexico in April, and appeared in the same month almost simultaneously in New Zealand, ⁵⁵⁷
July Australia, and in Arequipa, high up in the Andes of Peru: ²⁸⁵
Sept. 16

This great outbreak, like many of the previous pandemics, proceeded from St. Petersburg, at first, in a southwesterly direction; and for this reason was occasionally spoken of as the Russian influenza. Its course from Berlin was very irregular, but obviously along the lines of travel. The time required for it to traverse long distances and to cross the Atlantic corresponded closely with that consumed in the ordinary methods of travel and communication. Its appearance in large cities was usually heralded by the occurrence of scattered cases at different points, which preceded the general outbreak by from twenty-four to thirty-six hours. The spread of the epidemic, under such circumstances, was always very rapid, the greater part of the community being affected in the course of a few days. The duration of the local epidemics was somewhat modified by the density and extent of the population, but did not, in large cities, often extend beyond four to six weeks. Its subsidence was usually, like its onset, rapid, the occurrence of new cases frequently ceasing within two or three days of the very general prevalence of the disease. The effects of the malady, however, showed themselves in a remarkable depression

of the general health. Not only during the presence of epidemic influenza was the prevalence and severity of other acute diseases largely increased and the mortality from all causes augmented, but this condition of affairs continued for several weeks after the subsidence of the epidemic.

During the year 1890, ordinary cases of influenza, occurring sporadically or in local epidemics, have been more severe than usual, not infrequently manifesting the nervous phenomena characteristic of gripe. So noticeable has been this intensification of the symptoms of a familiar and usually trifling malady, that it has on many occasions given rise to the opinion that the now-dreaded gripe had broken out again. It is probable that this has not been the case, but that the conditions described are to be referred to an increased susceptibility to the influences which cause catarrhal fever on the part of many individuals, and which is the consequence of the epidemic of last winter. A less tenable explanation ascribes the intensification of ordinary influenzas to something of the original cause of the pandemic yet lingering in those localities where its main virulence was quickly spent. The wide prevalence of influenza afforded ample opportunities for the re-study of the disease.

Epidemiology and Etiology.—The epidemiology of influenza has been fully discussed in the literature of the past year. The study of the meteorological conditions under which it prevailed has strengthened the theory that humidity of the atmosphere has much to do with its development. Colleville⁵⁷⁷_{Apr., May} attributes the frequency of pulmonary complications in the military hospital at Reims, among the soldiers from the artillery casern, to the constant dampness of the latter. Maurel¹⁶⁴_{Jan.} emphasizes the preference of influenza for low countries and the valleys of large rivers. The claim that it avoids high altitudes on account of the low temperature is not in accordance with the first report of its appearance in the heart of Russia, in the middle of winter. The original centres of its development were the borders of the Indian Ocean and the Caribbean Sea, but the extension of these centres has become more and more advanced, until the disease has invaded the temperate zones. In the epidemics of 1784 and 1867, Cadiz was the port of entrance; since that time, Beyrouth and Constantinople. Debrun⁹²_{Jan.} asserts that its propagation is not effected by proximity

of localities, but by facility of communication. Its manner of advancing step by step was observed in the spread of influenza from the Piræus to Athens. Ucke,²¹_{Feb. 17} maintains that the atmospheric conditions bear an important relation to the spread of the infecting agent; the micro-organisms are carried high up by the warm currents and are precipitated again to the stratum in which they are effective by the eddies which the cold currents produce. Kowalski,⁸_{Apr. 2} describes influenza as a specific disease occurring under conditions constantly the same, due to atmospheric influences and complicated by the pathogenic germs at hand. Leyden,⁴¹_{Feb. 27} inclines to the opinion that the infection is due to a miasmatic chemical material derived from the atmosphere. English and American writers seem to consider the infection of miasmatic origin, dependent on meteorological conditions, although Greenley,²²⁴_{Mar. 15} asserts that influenza is independent of hygrometric, thermometric, and barometric changes.

Influenza is not essentially a winter disease, although it usually occurs in winter, but during or after warm winter weather consequent upon cyclonic disturbances in the upper air. Its development cannot be attributed to heavy rain-falls in the autumn or early winter, as after such phenomena at other times in the year it is not likely to occur (Greenley,²²⁴_{Mar. 15} Mitchel and Buchan²_{Apr. 12}).

When we look into the subject of the transmissibility of influenza we meet with two opposing theories,—that supporting the miasmatic origin and that the bacterial, with spread by contagion. These theories cannot be reconciled until bacteriological investigations yield more definite results. The former is advocated by Osler,⁵_{Apr.} Leyden,⁴¹_{Feb. 27} Otremba,²²³_{Nov. 2} Ucke,²¹_{Feb. 17} Kowalski,⁸_{Apr. 2} Fürbringer and Tibbles, the latter concluding²_{Apr. 12} that influenza is developed in media external to the body and is spread by atmospheric influences.

Colleville,⁵⁷⁷_{Apr., May} who advocates the theory of contagion, admits that the following facts noted by him in the military hospital at Reims are not in accord with his theory: first, during the treatment of 300 influenza cases among 500 other cases, only 20 of the latter were affected, and of the 50 nurses in attendance only 5; second, the time at which the attack occurred after exposure was disproportionate to the length of time of contact, or to the time elapsing after contact. In support of his theory, he cites an instance

in which a convalescent from scarlatina was attacked while being attended by a nurse who had just recovered from influenza, she alone having access to the patient. He concludes that influenza is contagious, depending on a bacterium developed outside of the body, and accounts for the delay often observed in the transference of the disease to a decrease in the virulence of the infecting principle after its first sojourn in the human body. He further asserts his belief that the bacterium selects the primary air-passages as the point of localization. Otremba²²⁸_{Nov. 3} believes that influenza is neither contagious nor imported from other localities than those in which it appears, but that the microbe of influenza is identical with that of simple coryza, which has attained its "summum potentiae" through favorable telluric or climatic conditions, such as those of temperature or humidity of the atmosphere. For this reason he recommends the term "epidemic catarrhal fever," as denoting the most frequent and predominating manifestations. Tibbles,²_{Apr. 13} supporting the theory of miasmatic infection, accounts for the absence of influenza in certain localities and the irregularity of its spread, not by the want of communication between infected and non-infected communities, but by a deficiency in the number of the germs or some change in the atmospheric conditions.

The following instance, reported by Proust,³_{Feb. 5} is strong evidence of contagiousness: The packet "St. Germain" received at Santander a passenger from Madrid, where influenza was prevalent; the day after his embarkation he was seized with influenza. The ship's doctor was taken sick on the fourth day, and in a few days the outbreak had become general; 154 passengers out of 436 were affected and 47 of the crew, making a total of 201. Antony¹⁰⁰_{Feb. 25} cites this as illustrating the possibility of the universal spread by means of contagion, established by the fact of the disease here affecting one person after another as the chances for contact occurred, and of its breaking out at sea, where its appearance, according to the anticontagionists, was to be accounted for only by a universal infection depending on meteorological conditions. He adduces two more arguments in favor of the theory of contagion, namely, that the anomalies of contagiousness are to be explained by what is so often observed in measles,—that is, the difference in individual receptivity,—and by the fact that influenza is often present long before it is recognized.

Lotz²¹⁴_{Mar.1} holds that either the infecting element has spread from a primary source, as St. Petersburg, or that such an element was in existence everywhere, and the cause which called it into life first arose at St. Petersburg; and that the disease spread either through the air or by transmission from individual to individual, possibly indirectly, by means of utensils. With Osler and others he lays great stress on the short period of incubation. Straub¹³³_{Oct} is an outspoken contagionist; he has observed that those were first attacked who came most in contact with outlying localities, and from this class the disease spread through a community. Pribram⁸⁸_{Nov.10,11} proves that 29 cases out of 34 were due to contagion. As already stated, the opinion of English writers seems to be in favor of the theory that influenza is dependent on a germ of miasmatic origin, the character of this germ being unknown; that the disease is severely infectious, but mildly contagious; that it spreads by atmospheric influences by development in external media; that its development outside of the body is the cause of its wide and rapid spread. It is of great importance to determine the length of the period of incubation as bearing on the question of epidemiology. A similar catarrhal affection was prevalent in London among horses before its more pronounced outbreak, as well in the preceding epidemics as in this. Kirn⁵⁴¹_{v.44, No.7} quotes some interesting observations made in the district prison at Freiburg: Of 406 prisoners 144 (35 per cent.) were stricken; of those in solitary confinement, 30 per cent.; of those in the common wards, 50 per cent.; of those in communication with the outer world, 70 per cent. The restriction of the outbreak to different corridors shows that it was not due to a miasmatic influence. Combe¹⁹⁷_{May 95} speaks, on the ground of his observations among the pupils of the primary school at Lausanne, against the contagion of influenza: of 3411, 1840 were affected. The age of the children had no influence on the predisposition. The girls were less frequently affected than the boys (which is different from what occurs in purely contagious diseases,—measles, scarlatina, varicella, r  theln). This and different other observations have induced the writer to conclude that the transmission of the disease from person to person is the exception, and that the dissemination of the disease is accomplished through the atmosphere. The boys were affected in greater numbers because they were more in the open air. In

regard to the universality of the outbreak in certain communities, it is to be observed that it may have existed in a modified form before it became general; therefore the rapidity of its spread was merely apparent. Kowalski⁸_{Am.} observed that the atmospheric conditions during the epidemic, studied from a bacteriological stand-point, were markedly unfavorable to the propagation of germs. He further writes: "The fact, also, should not be ignored that the earth's surface at the time of the appearance of influenza, at least in the East and in middle Europe, was covered with a thick layer of snow, and dissemination of the germ with the dust must be considered to be virtually excluded. According to my repeated bacteriological examinations of the atmosphere, which I had begun four years previously, and which, during the influenza in the first half of the month of December, 1889, I repeated, I can, with confidence, assert that a light rain-fall, lasting but an hour, is sufficient to purify the air completely of bacteria, and that after a snow-fall of a half hour the air for a considerable time is free from bacteria. The extension of influenza was independent of the direction of the wind-currents, and yet was dependent on the atmosphere, since purely contagious dissemination must be acknowledged to be untenable and to be confuted by innumerable observations; and when I review the whole subject I must confess that I have not succeeded in finding, from a bacteriological stand-point alone, a sufficient explanation for the etiology of influenza."

Bäumler³¹_{Am.} believes that influenza is a purely contagious disease of very intense infectiveness and with a very short period of incubation.

The mass of evidence leaves us very much in doubt, and it seems as if the question depended for solution upon data vitiated by the manner in which different observers have interpreted facts which do not warrant any very definite conclusion. Speaking generally, the contagionists cannot prove that the facts upon which they rely exclude the possibility of infection from miasmatic influences of either a chemical or a bacterial nature, except in one or two instances (notably that cited by Kirn,⁵⁴¹_{Am.} where he states that the outbreak in the prison at Freiburg was confined distinctly to certain corridors of the prison). The question is, whether one such instance, reliably reported, forms a sufficient basis for the theory of contagiousness.

Bacteriology. — Prudden,⁵⁹ made thorough bacteriological studies of material derived from 7 unmistakable cases of simple influenza, presenting various phases of symptoms. In 3 of the cases there was bronchitis, with considerable muco-purulent expectoration. In the remainder there was moderate coryza, in 2 with slight discharge. In all but 1 of the cases the discharge was obtained in the early stage of the disease; in that one on the fifth day. Cultures were made upon agar and agar-glycerin plates, at the temperature of the body. Several plates were made in each case and all of the more abundant bacterial species which developed were isolated and subjected to further examination and experiment.

In 2 of the 3 cases of influenza with bronchitis there were very large numbers of the streptococcus pyogenes; this was the prevailing species. All the rest were scattering forms, only found in the sputum in bronchitis, some of them the ordinary aërial bacteria. In the other case of bronchitis, there were large numbers of the diplococcus pneumoniae of Fraenkel and Weichselbaum, associated with the staphylococcus pyogenes aureus and several scattering forms.

In the secretion in the nose of 1 of the cases with coryza, the staphylococcus pyogenes aureus was found in small numbers. The other forms, which were not numerous, were scattering. While these cultures were being made, the scanty sputum from a case of moderately severe simple pharyngitis was studied in the same way; and in this the diplococcus of pneumonia was isolated in very large numbers, together with a considerable number of scattering forms.

The same observer examined, by culture methods, the sputum from 5 cases of prolonged and irregular pneumonia immediately following the attack of influenza; also material from the irregularly hepatized lung from a fatal case of pneumonia following influenza. Cultures of the sputum of 4 of the first 5 cases showed the diplococcus pneumoniae in large numbers, together with the staphylococcus pyogenes aureus in considerable numbers, along with scattering forms. From the lung of the fatal case, large numbers of the diplococcus were cultivated, and nothing else. It was a pure culture.

In summing up the whole series of examinations, the author emphasizes the fact that no special new forms of bacteria were

discovered which there is any reason to believe have anything to do with causing the disease. He regards as very grave the pneumoniæ following influenza, which, although apt to be irregular in course and atypical in morphology, are due to the same bacterial agency as is the ordinary acute lobar pneumonia. To what extent this may be complicated by the frequent presence of the pyogenic bacteria is a question which must be settled by further studies on the general relationship of this organism to inflammations of the respiratory organs and of other mucous membranes.

Prudden regards influenza, viewed from the stand-point of bacteriological investigation, as a condition predisposing to atypical pneumonia,—the conclusion already reached by the clinical method of observation. It is in many respects similar to the predisposition which measles furnishes, in children, to the incursions of various forms of pulmonary inflammation.

Marmorek,⁸ reports the results of examination of the bronchial secretion of 8 cases, 7 of which were pure influenza and 1 influenza complicated with catarrhal pneumonia. On microscopical examination there were found, as the prevailing bacterial form, round, ovoid, short, rod-shaped, lancet-formed varieties in rows of two, less frequently of four and eight, inclosed in a thick, transparent capsule, and capable of being colored by Gram's method. These, in their microscopical appearance, coincided fully with the Fraenkel-Weichselbaum pneumococcus. No other microbe forms were found as constant associates of the form mentioned. In another series of cases the diplococcus was wanting in six instances, but the examination was made in all these cases in the last ten days of the sickness, and after thirteen days had elapsed since the beginning of the attack. He mentions the characteristics which distinguish the Fraenkel-Weichselbaum pneumococcus from the streptococcus pyogenes: the developed form in the body, as the capsulated lancet or short, rod-like forms; the imperfect development on agar at the body-temperature in the form of indistinct cloudiness of the culture medium; the relatively less marked development in broth; the appearance in both culture mediums of relatively short, slightly tortuous chains; the low viability, and the inability to increase on gelatin at the temperature of the room.

The writer throws doubt upon the bacterial researches of

Ribbert, who claims⁶⁹_{no.4} to have found in influenza the ordinary pyogenic coccias the only constant bacterial form, while the diplococcus was absent, since the agar cultures of the latter and those of the ordinary streptococcus are scarcely to be differentiated the one from the other, both as regards the form of the colony and the appearance of the individual. The only manner in which this differentiation can be made is by the cultivation of colonies in gelatin, and this Ribbert had failed to do. Marmorek, in reference to the bacterium discovered by his own researches, believes there are two possibilities, namely, that we have either to do with a coccus very much allied to the pneumococcus of Fraenkel-Weichselbaum, but not the same, or that there exists an anomalous variety of the Fraenkel coccus, with less virulence and increased capability of thriving outside the body, namely, upon the mucous membrane of the respiratory tract. In support of this latter opinion he cites the frequent appearance of otitis media at the time of the influenza epidemic, as well as, although less frequently, of croupous pneumonia in the course of influenza. He summarizes the results of his investigation as follows: "We have been able to find in the bronchial secretion of cases with outspoken localization in the lungs no other micro-organism demonstrable by our methods of coloring and culture which is constantly present."

Weichselbaum,⁶⁹_{no.12} in his investigation of a series of 18 cases, made up of 15 cases of simple, uncomplicated influenza, 1 of influenza complicated with catarrhal pneumonia, 2 of influenza with lobar pneumonia developed later, reports the same disproportion between the number of the diplococcus pneumoniae and that of the streptococcus pyogenes and the staphylococcus pyogenes aureus, in favor of the first. He found, in 10 autopsies of cases of simple influenza and influenza with complications, the presence of inflammation of the frontal sinuses and antra of Highmore. He demonstrated the diplococcus pneumoniae in this pus by the microscope and by cultures. Levy,⁴_{no.1} whose investigations were conducted at the Strasburg Clinic, examined the secretion in 7 cases of otitis media. He found the diplococcus pneumoniae of Fraenkel-Weichselbaum in pure culture in 6 cases and in 1 case associated with staphylococcus pyogenes albus.

Babes⁵⁰_{no.3} and Kowalski⁸_{no.2} announce new forms which have heretofore not been described. The former describes a form

obtained from agar-agar cultivations and from cultures on nutrient gelatin and potatoes. These colonies consist of extremely small, constricted bacteria, sometimes forming short chains, sometimes drawn out into fine rods, sometimes round or pear-shaped. At their extremities vesicular swellings are found here and there. These bacteria readily produce lung affections. They flourish *in vacuo*. Babes names this form No. 1. From the cultivations derived from the secretions from the nose and frontal sinuses he obtains form No. 2. The bacteria of this form are deeply stained by the aniline stains and by Gram's method. They are constricted and somewhat pointed, with one convex and one straight side, often provided in the middle with an unstained stripe. They form groups of two, with the straight sides facing each other. In the case of mice and guinea-pigs they cause fatal pneumonia, with localization of the bacilli in the vessels of the alveolar septa. He suggests that these forms may be a pathological element in influenza.

Kowalski finds, besides the diplococcus and the streptococcus and staphylococcus, three forms not yet described: the first, bacilli similar to the bacilli in typhoid fever, showing plainly molecular movement, tinged lightly with aniline stains and developing at the temperature of the room; second, a bacillus which forms, in gelatin, snow-white, opaque colonies, thriving at the temperature of the room. He believes that these two forms have no causal relation to influenza. Since the culture of the third form in macroscopical appearance suggests the appearance of a firm jelly, he has given it the name, "jelly streptococcus." He considers that if this form had been found in every case of influenza it would have had a claim to be considered the cause of the disease, since the biological peculiarities of this form, studied by means of inoculations, go far toward explaining both the clinical picture of influenza and the epidemic outbreak.

Laveran and others have found the streptococcus pyogenes the predominant form.¹⁴ Dowd⁵⁰ summarizes as follows: "If we review the results, we find that both the diplococcus pneumoniae and the streptococcus pyogenes were found in the lungs, in the sputum and other secretions, and in various exudations, and each was many times found in pure culture; *e.g.*, in the pus in otitis media Finkler finds pure growths of one and Levy finds pure

growths of the other. Both of these forms are found in the mouth and air-passages in health or in conditions of slight disease, and they seem ready to set up their action when inflammation provides a suitable medium for growth. The general belief is that they have not been the cause of influenza, but that they have developed as the influenza has provided them with a suitable condition for growth, and that their development may have caused some of the complications."

As regards the blood, Klebs,⁵⁰ found a number of small bodies of highly refractive power and active movements, similar to the bodies found in pernicious anæmia, although in the latter they are never present in such numbers. Another distinction between the blood of influenza and that of pernicious anæmia is the absence of microcytes in the former. In the blood of a patient who died of influenza he found other oval bodies, which differed from the monads first described by the slowness of their movements; stained by Ehrlich's solution of methyl blue, they displayed, after coming to rest, flagellæ. He suggests that in all diseases in which the fever is due to hæmatozoa belonging to the protozoa we have a periodic type of fever, while the fever in which the schizomycetes are present is of the continued type. The bodies described by Klebs were, for the most part, found in the red corpuscles.

Kollman,⁴ is also among the few who have found anything significant in the blood. He describes, in addition to the monads found by Klebs, rod-shaped bodies with protuberant ends. He considers, however, that they may not be abnormal, as he has found them in the blood of healthy individuals. He was not able to detect the flagellate bodies in the red corpuscles. Leyden, Marmorek, Weichselbaum, and Laveran report negative results in examination of the blood.

Symptomatology.—The symptoms and complications of the disease during the pandemic were Protean in their character. The disease sought out the weak point in the individual and expended its virulence at this *locus minoris resistentiæ*. There were three ways in which its influence seemed to be exerted. In some, latent disorders were excited to renewed activity; or, secondly, morbid states were precipitated in those predisposed; while in a third group, the complication directly reflected the impress of the disease.

The symptoms were far from being exclusively catarrhal. It can

scarcely be said that they even predominated. Not a system of the organism escaped invasion. A classification into gastric, pulmonary, and nervous types is not far-reaching enough. Duflocq⁹²_{pp. 98 to 108} divides the varieties of influenza seen at Paris into four types: nervous, thoracic, cardiac, gastro-intestinal. The nervous type was characterized by headache, lumbago, pains in the limbs, fever, prostration. The onset might be sudden. The pain in the back was suggestive of variola. In the thoracic type, coryza, laryngitis, bronchitis, and pneumonia were the prominent manifestations. The cardiac type was marked by cardiac weakness, oppression, and distress, approaching the intensity of the symptoms of angina pectoris. The gastro-intestinal type was attended with nausea, vomiting, and diarrhoea.

Bäumler,⁹⁹_{May 15} at the Ninth Congress for Internal Medicine, at Vienna, held that the profound constitutional involvement pointed to grave changes in the blood, as evidenced by the subsequent pallor and the so-called urobilin icterus, as well as by the enlargement of the spleen. Microscopical examination of the blood revealed no changes that could be considered characteristic. Such changes as did occur, however, together with the vascular dilatation in the stage of pyrexia, prepared the way for complications. The nervous symptoms must be considered manifestations of some toxic action, as must also early damage to the heart, which in its turn may give rise to further complications, such as gangrene of the lower extremities.

Axel Ulrik, corresponding editor, Copenhagen, states that reports from 511 Danish physicians¹¹²⁶ disclose that, of 528 deaths attributed to influenza, 46 resulted from the uncomplicated disease, 39 from senility, 49 from phthisis, 273 from croupous and bronchopneumonia, 81 from other affections of the lungs, 5 from pleurisy, and 2 from empyema. Thirty-three deaths were noted from cerebral affections in the course of influenza.

Da Costa,⁹_{Jan. 19} in a clinical lecture, called attention to the prevalence of nervous symptoms as one of the most singular features of the epidemic. They comprised violent headache, severe pains all over the body, pain along the spine, and also, in a number of cases, by hyperæsthesia of the entire surface. In one case, delirium with headache was observed. In the case of a refined lady, the patient swore at the doctor. The mind may be lost from

the violence of the headache and delirium. He had seen a case with convulsions of the upper extremities, in which cerebro-spinal fever was excluded. In another, paralysis of the lower extremities followed influenza. In many of the so-called cases of pneumonia the lungs are deeply congested, concurrently with great debility. The process does not seem to be one of true pneumonic exudation. The dullness is not absolute. The high-pitched bronchial breathing of croupous pneumonia is found in only a few instances. There is no consolidation.

Complications.—Leyden,⁴ states that the course of the *pneumonia* was seldom that of the typical disease, that it rarely set in with a decided rigor, and that the inflammatory symptoms, notably the pain in the side, were but little marked. The local process, likewise, was not characteristic. Local signs were not detectable before the third or fourth day. Crepitation would be heard over a considerable area, soon disappearing and becoming evident at another. Not often did the process reach hepatization, with definite dullness. Typical rusty sputum was seldom observed. Often there was no expectoration, or it was catarrhal or sanguineous for a day or two. Crises were rare. The course of the inflammation was milder, dyspnoea and rapid infiltration being wanting.

Sokolowski,⁵⁷ found malignancy characteristic of the pneumonia complicating influenza, 7 of his 14 cases terminating fatally; in 3 cases death resulted from acute purulent meningitis; in 3 cases the pneumonia was central, without distinct physical signs; in 4 fatal cases an entire lung was infiltrated, and in 1 of these the remaining lung contained areas of lobular pneumonia; in another the hepatized lung contained collections of pus, and in 2 pleuritic and pericarditic effusions also existed; 1 case presented a pneumonia migrans.

Kahler, at a meeting of the Society of Physicians of Vienna,⁸ observed that the grave pulmonary and pleural complications of influenza pursued three courses. The most important, on account of its severity and malignancy, was that of the formation of abscesses in the lung and purulent pleurisy, in combination or occurring independently. An illustrative case presented, on post-mortem examination, abscesses in the lower lobe of the left lung, circumscribed purulent infiltration of the pleura, purulent pleurisy

and diffuse purulent bronchitis, without pneumonia. In another fatal case, with purulent infiltration of the pleura and purulent pleurisy, the abscesses were seated in the midst of hepaticized pulmonary structure. In the second variety, the lobular pneumonia or pleuro-pneumonia was insidious in character, the patient passing through an attack of influenza with bronchitis, and, at the end of convalescence, presenting the signs of consolidation. The third class included cases of grave bronchitis, in some instances giving rise to catarrhal pneumonia.

Nothnagel,⁵⁷ discussing before the Society of Physicians of Vienna the connection between croupous pneumonia and influenza, believed that there is no direct relation of one to the other. If a patient with influenza have also croupous pneumonia, the association is accidental. The invasion of the one but prepares the way for that of the other. Pulmonary catarrhs are common in cases of influenza, and experience teaches that inflammation readily occurs in a lung already the seat of catarrh.

As regards the *upper respiratory tract*, Lublinski,⁴¹ reported to the Laryngological Society of Berlin that he had observed, in influenza, hæmorrhagic rhinitis, acute and phlegmonous angina, croupous deposits on the tonsils and on the posterior wall of the pharynx. Acute laryngitis presented a peculiar appearance. At the onset the vocal bands were shining, swollen, reddened. Later, white spots appeared, resembling superficial necrosis. There were 2 cases of laryngitis subglottica. As *sequelæ* he saw 4 cases of laryngitis hæmorrhagica and 2 of laryngitis subglottica.

Mispelbaum,⁸¹⁴ discusses the *psychoses* following influenza. He saw 10 cases at the clinic at Bonn. The mental disorder set in during convalescence, and was preceded by a sense of fatigue and obstinate insomnia. It was initiated by acute delirium, which in all cases but 2 passed into melancholia of variable duration. The prognosis is favorable. Mispelbaum is in accord with Kraepelin in the opinion that influenza alone scarcely suffices to give rise to mental disturbance in a patient normally constituted, and that other injurious influences are concurrently responsible. More than half of the 10 cases reported by Mispelbaum possessed a neuropathic heredity, and 2 "nervous irritability." In the line of treatment, convalescence should be carefully watched and signs of mental aberration combated with stimulants and restoratives.

Mispelbaum reports, besides, 3 cases of tedious intercostal neuralgia and 2 of obstinate supra-orbital neuralgia. In 2 cases he saw persistent insomnia.

Van Deventer⁶⁸_{May} records the results of observations upon influenza in the Buiten-Hospital of Amsterdam. A large number of patients in the nervous wards were attacked. In the majority of cases no bad results followed. In many cases the influenza was latent in character. Alcoholism played a conspicuous part in the cases of so-called influenza psychoses. Delirium tremens was observed in 10 cases, 3 of which terminated fatally. Hysterical manifestations were present in some cases. In a number, an epileptic seizure inaugurated the attack of influenza.

The influence, favorable or unfavorable, of influenza upon existing disease of the nervous system is apparent rather than real. Delirium was rare in uncomplicated cases. The acceptance of an encephalic form of influenza is not warranted.

Helweg³⁷³_{v. J., No. 25} has given a most interesting account of an epidemic of influenza in an insane-asylum. On post-mortem examination of 4 cases, he found hyperæmia of the diploë, of the membranes, and of the cerebral structure. In ordinary cases the mental symptoms were aggravated. Acute maniacal delirium developed in patients previously presenting quiet and chronic forms of mental disease. In 2 cases, originally of puerperal psychoses, influenza, associated with pneumonia, was followed by improvement in the mental condition. Both patients were dismissed, a certain dullness of intellect, however, persisting. Helweg ascribes the improvement to the increased supply of blood to the brain, as a result of the hyperæmia.

Paine¹⁸⁹_{June} reports 7 cases of insanity, in which recovery, absolute or relative, followed attacks of influenza. On the other hand, he observed 4 cases, in which the development of insanity was ascribed to influenza. Of these, 2 recovered; 1, with acute mania, was thought curable; the fourth was complicated by paraplegia, but recovery was thought possible.

Kern³⁴_{Apr. 25} holds that influenza may be the sole etiological element in the development of a psychosis, or it may merely act as an exciting factor in disturbing the equilibrium of a nervous system already deranged or in intensifying a latent mental disorder. To cases of the former variety he would apply the name of typical in-

fluenza psychoses. He relates such a case in a laborer of 40, of low intelligence, who was seized, at the height of an attack of influenza, with acute mania which lasted for twenty-four days and ultimately terminated in recovery.

Pick, of Prague, ⁷⁵_{Feb. 16} finds in the analogy of influenza to other infectious diseases, in the occurrence of nervous and cerebral disorders in the course of the affection, sufficient explanation of the development of psychoses in predisposed individuals, and reports a case in a girl of 20, in whom a condition of acute mania continued for ten days, ultimately terminating in recovery. He quotes Crichton-Browne as having, in 1874, reported the occurrence of acute dementia in a chlorotic girl after an attack of influenza.

Blocq, ⁸¹_{June}, from a study of the relation between influenza and derangements of the nervous system, presents the following conclusions: 1. Certain nervous affections are really grippal, in the sense that they may be considered special localization of influenza upon the nervous system. 2. Another group depends equally upon the grippe, but secondarily. It is not the grippe itself, but the secondary infections which have determined the neuropathies. 3. A third category includes neuropathies in the development of which influenza has only been an exciting factor, determining a recurrence of a previous but recovered-from condition, or bringing about a new condition in an individual predisposed.

Holst ⁴_{July} reports 2 cases in which psychoses developed subsequently to influenza. The one occurred in a man of 17, without hereditary predisposition, and assumed the form of transient hallucinatory mania, from which recovery took place in five days. The second, which had a fatal issue, was in a girl of 20, with a neuropathic history, who presented delirium. Thrombi were found in the superior longitudinal sinus, in the veins of the central convolutions, with small hæmorrhages in the cortex and thrombi in branches of the pulmonary artery. Holst's view is that the delirium was the result of asthenia, the venous thrombosis a secondary result of the same cause.

Müller ⁴_{Sept. 16} refers to 2 cases of melancholia simplex, occurring as a sequel of influenza, and reports a third case, which, from the symptomatology and the course of the disease, he concludes to have been dependent upon cerebro-spinal meningitis.

Ónodi, ⁸⁴_{Mar. 22} before the Society of Physicians of Buda-Pesth, re-

ported *parosmia* in three colleagues suffering with influenza. One smelled tar and pitch; another shellac, sulphur, garlic, and cadavers alternately; the third decomposing meat, soap, and petroleum.

Bernhardt,⁴_{Mar. 21} before the Society of Physicians of the Charité, at Berlin, reported the case of a girl of 11, who, following an attack of influenza, attended with hæmaturia, presented a functional hysterical paralysis of the left arm. He also reported a case of nocturnal paralysis following influenza, in a neurotic man of 50, who complained of great weakness and tremor, and presented extreme feebleness of cardiac action. He could not move, after waking, until the arms and legs were rubbed.

Kleczkowski⁶⁷_{Aug. 15} reports the case of a boy of 7 years, in whom there appeared, after a second attack of influenza, an utter inability to stand erect, which still existed seven months later, despite the most persevering treatment. The boy could move the extremities in various directions while in bed, but when lifted or taken by the arms muscular contractions took place. There was neither pain nor loss of sensation. Sensibility was rather accentuated. The reflexes were normal. There was nothing indicative of an organic lesion. At a meeting of the Laryngological Society of Berlin, Heyman⁴¹_{Mar. 1} reported a case of bilateral palsy of the palate, following influenza, in a patient 12½ years old, in which improvement followed faradization. Herzfeld reported the case of a boy of 5, in which, twelve days after an attack of influenza, speech and hearing were suddenly lost. Nothing abnormal was found about the ears. The mouth could not be opened. There was no paralysis of the facial nerve. On the following day, hearing returned. As the boy could not stand or walk and did not feel deep pricks of a needle, hysterical paralysis was diagnosed. Some days later, speech and sensation returned. Inglott²_{Apr. 15} reports a case of influenza in a woman of 32, in whom, during convalescence, consciousness was suddenly lost, while the eyes remained open, and the arms and legs remained in positions in which they were placed. The seizure lasted two hours, yielding to an enema of asafoetida and camphor mixture.

Churchhouse²_{Mar. 29} observed *tetanus* develop in a woman who had been nursing a case of influenza, and who had herself presented symptoms of influenza. Trismus, first noticed on taking

food, was followed by general rigidity, and finally by opisthotonos. Death occurred seven days after the onset of the symptoms. A wound was looked for, but none found.

Colley ⁸⁰_{Aug. 28} presented, at a meeting of the Greifswald Medical Society, a case of *exophthalmic goitre*, which developed during an attack of influenza in a woman of neuropathic predisposition who had previously presented tachycardia and cardiac palpitation. He also refers to a like case reported by Holz. ⁸⁰_{Jan. 16}

Erlenmeyer ⁴_{Mar. 21} reports the case of a man of 25, without hereditary predisposition, not syphilitic or alcoholic, not addicted to morphine, having suffered no trauma, in which *Jacksonian epilepsy* followed an attack of influenza. In the first attack there was numbness of the left hand and arm, with muscular twitching, loss of consciousness, clonic convulsions, and suffusion of the face, neck, chest, and tongue. In the second, two convulsions followed in rapid succession, without loss of consciousness. It is supposed that the influenza occasioned a localized derangement of the cortex, perhaps a minute hæmorrhage in the cortical centre for the left arm.

A fatal case of *cerebral abscess* following influenza is reported by Aczel. ⁸⁴_{Mar. 30} At the autopsy, an abscess as large as a hazel-nut was found in the posterior portion of the right frontal lobe,—a result, probably, of metastasis from a purulent bronchitis. Hoffmann, ⁵⁷_{June 1}, at a meeting of the Greifswald Medical Society, showed a case of cerebral abscess following otitis media suppurativa of influenza. Operating for pus in the mastoid process, he found, between the dura and the bone, an abscess connected with an abscess in the occipital lobe of the brain. Both were evacuated. Recovery was uninterrupted.

At a meeting of the Royal Academy of Medicine of Turin, May 23, 1890, Foà ²_{June 21} described the *lesions* which he had found in the *spinal cord* of a woman who had died of influenza. The patient had the usual symptoms, followed by bronchial catarrh, broncho-pneumonia on one side, hepatization upon the other. Sections of the spinal cord showed intense hyperæmia, the substance of the cord being dotted with minute red points. Microscopically, numerous hæmorrhagic foci were seen in all divisions of the cord, notably in the upper two-thirds of the dorsal and the upper portion of the cervical region. There was recent infiltration of red corpuscles among the nervous elements, which were

slightly separated and compressed, but not visibly altered in structure. Some of the vessels were obliterated, and it was in the neighborhood of these that the hæmorrhages had taken place. Degenerative changes were also present in places, the axis-cylinders being enlarged to five or six times their ordinary size and the nerve-fibres degenerated. These degenerative foci were, as a rule, independent of the hæmorrhagic patches, but in the highest part of the cord the two lesions were, in some places, found together. The hæmorrhagic foci were chiefly situated in the posterior columns, almost always at their periphery; the degenerative foci occurred mostly in the lateral columns. Neither the gray matter nor the posterior roots showed the least alteration. Foá thinks that the lesions were due to occlusion of vessels, giving rise, in some places, to hæmorrhage, and in others to alteration in the nutrition of the nerve-fibres. He also thinks it probable that the occlusion was caused by an accumulation of micro-organisms, but admits that he was unable to verify this conjecture. Examination of the brain was not permitted.

De Brun,^{81 Nov. 18} discusses the *nervous complications* of influenza. Meningitis may arise directly as a result of the general infection, in which case it occurs during the progress of the disease, or secondarily to otitis, in which case it occurs after the influenza has disappeared. As pulmonary congestion, with hæmoptysis, occurs during an attack of influenza, so may cerebral congestion occur, manifested by headache, vertigo, perhaps transient loss of consciousness, without *sequelæ*. Under similar conditions, cerebral hæmorrhage may take place, with typical hemiplegia. The myelitis of influenza may be diffuse or systemic. The most frequent variety of the former has been transverse dorsal myelitis. In some cases recovery has been spontaneous and rapid. The condition is one rather of congestion than inflammation. All cases, however, do not terminate so fortunately. The complications of the peripheral nervous system are the most common, and, among these, neuralgia takes first rank. Trigeminal neuralgias are most frequent. Next in frequency are intercostal neuralgias, then sciatica. Articular pains are common. In many cases neuritis is the source of the pain. Trophic changes sometimes follow. Optic atrophy has also been a sequel. Rarely, there has been anæsthesia. Disorders of motility are much less common than

those of sensibility. Influenza may re-awaken neuroses from which the patient has long been free, exaggerate existing or even provoke the explosion of neuroses in those who have never been affected. These nervous complications distinguish influenza from dengue.

Herzog⁴_{Sep.1} reports 2 cases of myelitis following influenza: 1 in a boy of 11, in whom the spinal symptoms appeared two months after the attack of influenza, and the other in a girl of 8, in whom the spinal symptoms appeared three weeks after the onset of the attack of influenza. Fiessinger⁵⁵_{Oct.18} reports a case of spinal meningitis in the course of influenza, in a girl of 18, in which death occurred on the eighteenth day, with symptoms of glosso-labio-laryngeal paralysis. Remak,⁴_{Feb.31} at a meeting of the Berlin Medical Society, reported a case of acute multiple neuritis in a man of 50, following influenza. The case is interesting from an etiological point of view, because it is held that multiple neuritis is always the outcome of some variety of infection. Henoch reported a similar case in a girl of 11. Eisenlohr,⁶⁹_{Mar.30} at a meeting of the Hamburg Medical Society, presented 2 cases of rapidly progressive paralysis following influenza, of which 1 bore a certain resemblance to diphtheritic paralysis, being probably a peripheral neuritis, and the other an analogy to acute ascending paralysis, differing, however, in the participation of the bladder and the existence of cutaneous and muscular hyperæsthesia. The latter was also probably a multiple neuritis of fulminating character. At a meeting of the Laryngological Society of Berlin, Krakauer⁴¹_{Mar.17} reported a case of paralysis of the left recurrent laryngeal nerve, with hoarseness and aphonia, after an attack of influenza, in a man of 39. The left vocal band maintained the cadaveric position, the right vicariously crossing the median line. Complete closure of the glottis could not be effected. Some degree of improvement followed faradization and administration of strychnine. In discussing the trigeminal neuralgia following influenza, Nothnagel,¹¹⁴_{v.17, Nov.3,4} referred to the fact that it has long been known that various neuralgias occur in the course of influenza. Of 10 cases of trigeminal neuralgia under his observation, 8 had certainly been preceded by influenza. In all, alcoholism, syphilis, malaria, and carious teeth were excluded. In age, the patients ranged from 15 to 34; 6 were males, 2 females. In 3 cases the neuralgia set in during the febrile stage, in 4 after it.

The occurrence of trigeminal neuralgia in influenza is analogous to similar conditions in other infectious diseases. In addition, there is, in influenza, the nasal irritation. That the neuralgia is not due to the latter alone is evidenced by the occurrence of neuralgias in other situations.

Frankl-Hochwart,¹¹⁴_{v.17, Nov. 3, 4} reports 10 cases of neuralgia of the fifth nerve in association with influenza, in 3 of which the neuralgia appeared during the existence of the fever. In 5 cases the paroxysms recurred at the same hour. Strong faradic currents proved useful in treatment. Westphalen,²¹_{May 22} observed neuralgia, especially involving the trigeminus, as one of the most common complications of influenza. Involvement of motor nerves was rare, excepting those supplying the ocular muscles. Joffroy,⁸_{Apr. 2} observed 6 cases of scapulo-humeral neuralgia, directly consecutive to attacks of influenza. Two of the patients presented evident atrophy of the deltoid, the supra-spinatus, the infra-spinatus, and the pectoralis major. In one, the atrophy also involved the biceps. All the muscles named presented reactions of degeneration, the result probably of preceding neuritis. Fukala,⁵⁷_{June 22} in reporting 2 cases of paralysis of accommodation following influenza, states that it is characteristic of this affection to last for a long time, obstinately resisting treatment. It may occur alone or in association with paralysis of other muscles supplied by the third nerve. One eye is usually affected, or, if both, one in greater degree than the other.

Bergmeister,⁸⁴_{Nov. 4} reported, at a meeting of the Society of Physicians of Vienna, 1 case of loss of accommodation, 1 of neuritic optic atrophy, and 1 of simple optic atrophy, in all of which, it was stated, vision had been unimpaired prior to an attack of influenza. Gillet de Grandmont,²⁹⁰_{June 21} observed three characteristic periods in the course of influenza. The first was marked by nervous disorders, the second by congestive complications, the third by organic degenerations. Each of these corresponds with different ocular derangements. In the first there is pain at the muscles of the eye, the patient preferring to close the eyes rather than suffer the fatigue of moving the muscles. During the second there are distressing sensations of luminous, scintillating spots before the eyes, occasioned by derangements of the retinal circulation. If the congestion is excessive, there may be hyaloiditis, or even miliary hæmorrhages into the retina or choroid. In the third stage, in certain

hypermetropes and presbyopes, who have gotten along without glasses, proximal vision may be lost in consequence of pareses of the muscles of accommodation.

Bernhardt was interrogated about a case of diabetes, in which sugar disappeared from the urine and thirst diminished after an attack of influenza, while anorexia and rapid emaciation set in. Senator replied that he had seen the sugar in the urine in diabetes diminish and disappear in the course of febrile affections as well as in influenza. Saundby²_{Nov 10} reports 2 cases of diabetes observed after attacks of influenza, one in a man of 30, the other in a woman of 22.

Haug³⁴_{Feb 25} makes three main groups of the *ear complications* of influenza. The first sets in with hyperæmia and swelling of the Eustachian tubes, tympanum, and tympanic membrane, which may disappear in the course of from ten to twenty days, or may be followed by exudation, the transition to the second group. The tympanic cavity becomes filled with fluid, the tympanic membrane infiltrated. The fluid, first serous, becomes mucous, then purulent, and in from two to five days rupture may take place. The discharge may continue for from three to five weeks, becoming progressively less, until finally cicatrization at the site of rupture takes place. Haug³⁴_{Feb 25} describes hæmorrhagic otitis media as characteristic of the epidemic. It sets in between the third and seventh day of the disease, and is attended with hæmorrhagic effusion into the tympanum, manifested by intense pain. Spontaneous perforation usually takes place in the course of twelve hours. Dreyfuss and Schwabach¹_{Nov 24} describe a form of ear disease frequently resulting from influenza. Ecchymoses, varying in size from a pin-head to a pea, occur in the membrana tympani, and exudation, serous, purulent, or hæmorrhagic, takes place. The most successful treatment was early paracentesis. Glover³⁷_{Feb} reports 2 cases of otitis media acuta, 12 cases of otitis media acuta suppurativa, and 1 of otitis externa et media following influenza. The cases pursued a relatively rapid course. After the primary period, the pain was intense and hearing became impaired.

Gruber³⁴_{Mar 4} at a meeting of the Society of Physicians of Vienna, presented tables showing the enormous increase in the cases of catarrhal and suppurative otitis media treated at his clinic during the months of November, December, and January, 1887, 1888, 1889, and January, 1890. The inflammations were

of a high grade of intensity, and, what is otherwise unusual of purulent processes, bilateral. The affections were marked from the outset by extraordinary hyperæmia, which extended to the adjacent bones and soft parts. The tympanic membrane was more commonly than usual involved from the beginning. In 6 cases it was necessary to open the mastoid process. Politzer stated that he had operated upon the mastoid process in 10 cases of otitis following influenza. Chatelier³⁷ reports 5 cases of otitis media suppurativa following influenza, in which an opening was made in the mastoid process to evacuate the pus. Recovery followed in each.

Peter¹⁴ saw a case of influenza in which purulent catarrh of the ear existed for a long time, and to which was finally added a brachial monoplegia, soon accompanied by paralysis of the lower extremity, and, finally, by aphasia. There was here a meningo-encephalitis, the result of the ear disease, the outcome of grippe.

Wilks⁶ has emphasized the extreme prostration and *cardiac weakness* which occasionally follow attacks of influenza. He observed 4 fatal cases in professional men, without any history of previous heart disease, in which the weakness of the heart was apparently the immediate cause of death. Aufrecht⁶⁹ also lays stress upon the danger of cardiac failure in the course of influenza. Tisné¹⁵² states that fatal asystole may result in a case in which the heart is already damaged. In 1 case of chronic rheumatism, without cardiac murmur, characteristic endocarditis was observed to develop. Myocarditis also resulted from influenza. Cardiac asthenia from nervous derangement was a fatal complication of pneumonia. Rôhring⁷⁵ has reported the case of a soldier, aged 33, without neurotic associations, who, after an attack of influenza, presented the symptoms of angina pectoris, and the physical signs of hypertrophy and dilatation of the right side of the heart.

Haushalter¹⁸⁴ records a case of *endocarditis* following a relapse of influenza. The patient, a female domestic of 26, was suddenly seized with intense dyspnœa. The pulse became small, the face cyanotic, the body covered with a cold sweat, the lungs full of râles. No cardiac murmur had been detected. Death took place, and the autopsy revealed, in addition to pleural and pericardial effusions, œdema, congestion and atelectasis of the lungs, vegetations upon the auricular surface of the mitral valve. In a second case, in a

chlorotic girl of 23, in which there was a soft, mitral, systolic murmur, a diagnosis of endopericarditis was made. In a third case, in a woman of 66, in which dyspnœa and cyanosis were present and no heart-murmur was detected, right hemiplegia suddenly developed, followed by coma and death. The myocardium was found to be fibroid in places, the aorta atheromatous, while upon the free margins of the aortic semi-lunar valves were coherent, fibrinous vegetations of various sizes. In the left Sylvian artery, in the central region, an embolus was found resembling the vegetations on the aortic valves.

Surmont,¹⁷_{Oct.14} at a meeting of the Société de Médecine du Nord, reported a case of infectious endocarditis, following influenza, in an alcoholic patient with pneumonia who succumbed rapidly, presenting multiple emboli and meningeal phenomena.

Cross,²_{Apr.26} has reported the case of a woman aged 49, who, a week after an attack of influenza, complained of severe pains in the arms, which were found to be hard, swollen, and tender, with all the appearances of *phlegmasia*. It was fully a month before the arms returned to their original condition. Burghard,²_{May} has reported 4 cases in which phlebitis of the left femoral vein was observed,—in 1, two weeks after; in each of the remaining 3, three months after an attack of influenza. Matlakowski,⁵²⁰_{Dec.28} reports 2 cases of venous thrombosis in association with influenza. In one the left, in the other the right, was involved.

Loison,²¹¹_{Aug.17} has reported a case of *gangrene* of the leg in the course of influenza, in an otherwise vigorous man of 37 years of age, with no detectable lesion of heart or vascular system. On the sixth day the patient had an attack of diarrhœa, which responded to treatment. On the night of the following day, without preceding exertion, shock, traumatism, or compression, a sensation of numbness was suddenly perceived in the left leg, below the knee. This was followed by formication, weakness, discoloration, and coldness. Pulsation could be detected in the femoral artery at the highest part of the thigh, but not in the posterior tibial or in the dorsal artery of the foot. Elevation and occlusion dressings were applied for a time, but, finally, amputation was performed. The operation was strikingly bloodless, although no special measures to control hæmorrhage were taken. A firm, adherent clot occupied the femoral artery from the level of amputation to the popliteal

space. The anterior tibial and the peroneal were almost empty, a short distance above the ankle being entirely dry. The femoral vein was also occluded by a soft clot, which, in the veins at the calf, was of the consistence of currant-jelly. Both arteries and veins were yielding. Microscopic examination of the endothelium was embarrassed by the condition of gangrene. There was nothing in the case to explain a lesion of the endothelium except influenza. The view of Loison is that the original lesion was embolic, thrombosis forming secondarily.

Rheiner²¹⁴_{Jan. 15} reports the case of a woman of 30, the mother of several healthy children, who, after an attack of influenza of three weeks' duration, developed a fatal *pernicious anæmia*, with enlargement of the spleen, chills and fever. The autopsy failed to reveal any characteristic pathological lesions.

Olivier²⁰⁸_{Mar. 1} reports 4 cases of *pseudo-rheumatism* in influenza, and concludes: 1. In the decline of, or in the convalescence from, influenza, one observes in certain non-rheumatic subjects articular manifestations, differing from those of rheumatism by their fixity and their course. 2. These arthritides may present different forms, —arthralgiæ, mono-arthritides, subacute polyarthritides, —approaching, in their onset and their character, infectious pseudo-rheumatism. 3. They may be accompanied by cardiac disorders, —arrhythmia, soft apical murmur. 4. They recover by rest, envelopment in cotton, salicylate of sodium, antipyrin, in two to three weeks. 5. They do not appear to give rise to suppuration or ankylosis of the involved joint.

As regards *genito-urinary complications*, Trossat²¹¹_{Mar. 30} has reported a case of cystitis in a woman entirely free of vesical derangement prior to the onset of an attack of influenza. In 2 cases acute exacerbations of a chronic catarrh of the bladder occurred. Menstruation was deranged, being absent or scanty, or excessive, in some instances painful. In 1 case vicarious epistaxis occurred. One patient, with only moderate fever, aborted at six weeks.

Leyden⁴_{Mar. 10} reports a case of influenza in a woman who seemed never to have recovered. Finally, vomiting set in. The urine was passed in small amounts and œdema developed. The urine was hæmorrhagic and albuminous. Death occurred, and at the section glomerulo-nephritis was found. Leyden also saw 3 fatal cases of nephritis combined with pneumonia.

Before the Greifswald Medical Society, Mosler,⁵⁷ reported a case of influenza in a laborer of 17, in which a *hæmorrhagic diathesis* manifested itself. Death occurred from uræmia, the result of a hæmorrhagic nephritis. The autopsy revealed nephritis, cystitis, and gastro-enteritis hæmorrhagica, in addition to pleurisy, pericarditis, hypostatic pneumonia, and bronchitis.

Ewald,⁶⁰ reported a case in a woman of 32, in which the diagnosis of preceding influenza rested upon the statements of the patient and her friends. Purpura hæmorrhagica developed, together with bilateral pneumonia. There were hæmorrhages from the gums and nose, and the patient died in collapse. Ante-mortem examination of the blood revealed a diminution of the number of red corpuscles to 2,000,000, and of the amount of hæmoglobin to 50 per cent. At the autopsy, in addition to the pneumonia, there were found ecchymoses of the skin and pericardium, hæmorrhages in the mucous membrane of the stomach and of the pelves of the kidneys.

Mesnard,¹⁸⁸ May 11, June 8 has reported a case of influenza in a woman of 22, in which *hæmoptysis* occurred, while only the signs of a bronchitis could be detected, which three months later had entirely disappeared. A special name has been given to cases in which hæmorrhagic complications are present—"hæmorrhagic influenza." Mesnard has also seen epistaxis in the course of influenza.

Before the Society of Physicians of the Charité, at Berlin, Landgraf,⁴ reported having seen 5 cases of *intestinal hæmorrhage* in connection with influenza, 1 of which terminated fatally.

Schwimmer,⁸⁴ at a meeting of the Society of Physicians, Buda-Pesth, reported having seen cases of herpes iris and circinatus, erythema iris and circinatus, erythema scarlatiniforme, and erythema exsudativum multiforme in connection with influenza. He considers these as *angio-neuroses* belonging to the same category as the medicamentous rashes. Urticaria and a morbilloid exanthem were also observed. In 3 cases, psoriasis developed in patients who had previously never had psoriasis.

Fuchs,²² had under observation a case of influenza, complicated by an ominous *corneitis*, which commenced as vesicles. The latter rupturing, small ulcers remained. From the arrangement of these the name keratitis dendritica was taken. Kahler also observed a case of influenza complicated by keratitis dendritica.

Lostalot,¹⁵²_{Mar. 20} in a communication to the Société Clinique de Paris, reported a case of influenza complicated by purulent *parotiditis* and oedema of the larynx in a woman 28 years old, who had repeated chills, fever, violent headache, muscular and articular pains, anorexia, and nausea at the close of an attack of influenza. In the course of a day or two, an adeno-phlegmon of the parotid gland of one side developed, with intense inflammatory oedema of the face and neck. Deep incision brought only black blood, mixed with a little pus. On the following day, although the swelling of the face had somewhat subsided, an attack of suffocation necessitated immediate tracheotomy. The patient ceased to breathe, but revived after artificial respiration had been practiced for five minutes. Subcutaneous emphysema and suppuration supervened, but submitted to appropriate treatment. The patient finally recovered.

Surgical Complications.—Ewald,⁶⁹_{Mar. 2} has reported the fatal case of a medical man with suppuration of the antrum of Highmore, following influenza. The autopsy revealed a circumscribed, perivascular, purulent, basal meningitis. Möser,⁴_{Apr. 14} reports 2 cases of periostitis of the upper jaw, occurring four and five days, respectively, after the onset of influenza. In one, suppuration took place. Evacuation of the pus afforded relief. In the second, suppuration occurred, in addition, at the mastoid process, followed in turn by otitis media.

Bacelli,⁶_{Mar. 11} observed that, in the surgical wards, during the prevalence of influenza, indolent ulcers and traumatic lesions assumed a gangrenous character,—it was believed as a result of infection by the microbe of influenza. Four cases of pyæmia are reported by Bennett,⁸_{Mar. 8} occurring in surgical patients, after attacks of influenza, while still under observation.

Influenza in Children.—Comby,¹¹⁸_{Apr.} found respiratory complications rare and benign in children. Of 218 cases, bronchitis, usually of a mild character, was present in 18. In a child of 4, recovery was retarded by broncho-pneumonia at the left base. One case, in a child of 2 months, was complicated by fatal athrepsia. Anæmia and emaciation sometimes succeed the disease. Auscultation of the vessels of the neck in 6 cases detected a continuous souffle, with reduplication. Complications involving organs of special sense were relatively frequent. Of 218 cases, conjunctivitis or keratitis was

seen in 14. In 13 there was otitis media, with perforation and discharge of pus. Treatment with tepid irrigation, followed by powdered boric acid, was successful. There was 1 case of tibio-tarsal arthritis and 1 of catarrhal jaundice. Meyer,^{69 Jan. 22} observed an infant at the breast of a mother suffering from influenza present similar symptoms in the course of a few days.

Influenza in Pregnant Women.—Cameron,^{222 Apr.} reports 3 cases in which abortion took place within five days from the onset of attacks of influenza. The loss of blood was unusually great. In one case, uterine hæmorrhage and uterine tenderness persisted for ten days after delivery.

Lwow,^{21 Apr. 22} reports 8 cases of influenza in the second and 2 in the first half of pregnancy, in multigravida. Of the former, 2 aborted on the fourth and fifth days of the disease, respectively. Of the latter, 1 aborted on the seventh day, the other two months later. In this case, the membranes had undergone fatty degeneration, and there was also endometritis decidualis hæmorrhagica.

Diagnosis.—The diagnosis of influenza may be exceedingly simple or embarrassingly difficult. The knowledge of the existence of an epidemic will aid in arriving at a conclusion. The disease which influenza most closely resembles is dengue. So close is the likeness that for some time the French medical profession were divided as to whether the epidemic of 1889–90 was one of influenza or one of dengue. There are, however, a number of differentiating features. An ordinary attack of influenza lasts from three to ten days; of dengue, from one to three weeks. The former is marked by muscular debility; the latter, by intense articular pain, especially at the knees, occasioning a characteristic limping gait. Catarrhs of the various mucous membranes constitute the rule in influenza, the exception in dengue. The latter presents a characteristic eruption. In influenza, eruptions are rather exceptional, and, when present, variable. The temperature of dengue is apt to be remittent, and higher than that of influenza. Convalescence from influenza is generally rapid; from dengue, slow and tedious.

For a few days, influenza and typhoid fever might be confounded with one another. The former, however, does not present the dilated pupil so often seen in the latter, nor ever a rose rash; the temperature curves of the two diseases are distinctly different, and the characteristic stool of typhoid fever is wanting in influenza.

In cases in which a rash is present, some doubt may arise as to the existence of scarlet fever or of measles. In influenza, however, the rapidity of pulse, the characteristic appearance of the tongue, the glandular involvement of scarlatina, are wanting, and the further course of the two diseases is different. Measles and influenza may be so much alike that real difficulty in the diagnosis may arise. Influenza may present a morbilloid eruption, while, in both, catarrhal symptoms are prominent features; but the duration of the exanthem, the age of the patient, the occurrence of other cases in the same family, and the character of the *sequelæ* are the points of distinction.

Meningitis or peripheral neuritis may complicate influenza. In the uncomplicated disease, however, the muscular contractions, the paralyses, and the changes in the eye-ground of the former and the loss of power and degenerative reaction of nerve and muscle of the latter are wanting.

Treatment.—There is no recognized specific against the disease. Quinine more nearly approaches this position than any other remedy.

C. Graeser,⁴_{Dec. 22, '90} recommends quinine as a prophylactic for influenza, quoting Eichhorst as designating quinine a specific in this disease. Seven and a half grains (0.50 gramme) should be given daily. Tranjen,⁴_{Feb. 17}, a military surgeon in Bulgaria, following this suggestion of Graeser, directed at the outset of the epidemic that every member of his battalion be given 0.30 gramme (4½ grains) of sulphate of quinine daily, and that manœuvres in the open air be forbidden. This was continued for twelve days. While the epidemic spread in the immediate vicinity of the barracks, few of the soldiers were affected. Similar good results, however, were not had when the disease already existed. Then antipyrin rendered the greatest service.

Duboy,⁸⁴_{Mar. 22} at a meeting of the Society of Physicians, Buda-Pesth, compared influenza to malaria. Anæmia is a common sequel of both. Recovery was most rapid from the administration of quinine. As a prophylactic measure, he prescribed 3 grains (0.20 gramme) twice daily. Of 26 cases thus treated, influenza occurred in but 2, and in these in a mild form.

After the onset of the disease, the patient should go to bed, taking, if there be no contra-indication, a mercurial, followed by a

saline. The diet should be light and easily digestible. The secretions should be maintained. Good results are to be expected from a distinctively diaphoretic treatment. In the only 3 cases treated by Eichhorst,²¹⁴_{Mar. 1} with subcutaneous injections of pilocarpine, the results were strikingly speedy and successful. Pyrexia may be met by cold sponging, cold affusions, the cold pack, or the cold bath. Antipyrin, antifebrin, and kindred remedies were largely used during the epidemic, and unquestionably rendered excellent service. Giovanni,⁵⁴⁰_{Jan. 2} however, wisely warns against the use of the ordinary antipyretics in the treatment of influenza, because, though they may lower the temperature, they aggravate the adynamic state of the patient. He recommends rather tincture of strophanthus, from 1 to 5 minims (0.07 to 0.33 gramme), with milk and cognac, and in grave cases inhalations of oxygen and subcutaneous injection of strychnine.

Nothnagel,⁵⁷_{Jan. 12} emphasizes the fact that the greatest care must be exercised during convalescence, which may be tedious and protracted.

Gellie,¹⁸⁸_{Mar. 9} in a communication to the Société de Médecine et de Chirurgie de Bordeaux, as an outcome of results obtained by himself and by some of his friends, strongly recommends the use of sulphate of quinine in the treatment of influenza. Large doses should be administered, in accordance with the age and temperament of the patient and the severity of the attack. Quinine is a nervine and antiseptic, and, it is claimed, notably abridges the duration of the disease and prevents grave complications.

Wood¹¹²_{Mar.} obtained the best results from diaphoresis followed by quinine. He found a combination of pilocarpine and morphine to act better than antipyrin:—

R Pilocarpinæ hydrochloratis, gr. ss (0.03 gramme).
 Morphinae sulphatis, gr. $\frac{1}{2}$ (0.02 gramme).
 Aquæ, f 3iij (96.00 grammes).
 M. Sig.: A teaspoonful every fifteen minutes, pro re nata.

The following formula acted favorably when pulmonary complications existed:—

R Ammonii chloridis, 3ij (8.00 grammes).
 Apomorphinæ hydrochloratis, . . . gr. j (0.07 gramme).
 Mist. glycyrrhizæ comp.,
 Syrupi, āā f3iiss (45.00 grammes).
 M. Sig.: A dessertspoonful every two or three hours.

Diarrhœa, when present, was controlled by 10 grains (0.65 gramme) of subnitrate of bismuth and $1\frac{1}{2}$ grains (0.10 gramme) of carbolic acid, given in capsules every two, three, or four hours.

Dujardin-Beaumetz⁶⁷ has formulated the treatment of the different varieties. In the painful form, he found antithermic analgesics to render signal service. Among these, antipyrin and exalgine hold the first place. Phenacetin, 15 grains (1 gramme), twice a day, may be prescribed. These failing, injections of morphine may be made. In the gastro-intestinal form, absolute rest in the recumbent posture should be maintained, and preparations of opium, of which paregoric is the best, administered. In the catarrhal form, quinine, 4 grains (0.25 gramme), morning and evening, should be given, alone or combined with antipyrin, 15 grains (1 gramme). Aconite is also useful in this variety. Stimulants may be required. Pulmonary complications call for cardiac tonic treatment:—

R Caffeinæ,
 Sodii benzoatis, āā gr. xxx (2 grammes).
 Aquæ bullientis, ℥iiss (6 grammes).
 M. Sig.: ℥xv b. vel t. d., subcutaneously.

If possible, convalescence should be spent in the country.

Peter¹⁴ recommends for the cephalalgia and rachialgia a blister to the nucha. The pulmonary hyperæmia may be relieved by a like application to the chest. Similar treatment may be directed to the otitis. Syncope should be combated by injections of ether. Convalescence requires quinine.

MacLagan⁶ prescribed salicin, 20 to 40 grains (1.30 to 2.60 grammes), every hour, for three or six hours; then, every two hours, for a day; after that, at long intervals. He reports that convalescence commenced in twenty-four hours in all cases, and, in most, in twelve hours. There were no serious complications. In a large number of cases, Rabener⁵⁷ obtained excellent results from the administration of creolin, 0.01 gramme ($\frac{1}{4}$ grain) every two hours, and inhalations of a 10-per-cent. solution. The complications are to be treated on general principles, special attention being directed to the condition of the heart, and sustaining measures instituted from the first.

Moure¹⁶⁸ treated the laryngeal complications by sprays of carbolic acid, cocaine, boric acid, and resorcin:—

R Acidi carbolici cryst., . . . 9 to 15 grains (0.60 to 1.00 gramme).
 Cocainæ hydrochloratis, . . . $3\frac{1}{2}$ to $7\frac{1}{2}$ grains (0.24 to 0.50 gramme).
 Glycerinæ, . . . f $\bar{3}$ iss (45 grammes).
 Aq. dest., . . . f $\bar{3}$ xiv (420 grammes).

M. Sig.: Spray t.i.d.

R Acidi borici, 75 grains (5 grammes).
 Resorcinæ cryst., 30 grains (2 grammes).
 Aq. laurocerasi, f $\bar{3}$ iss (45 grammes).
 Aq. dest., f $\bar{3}$ xiv (420 grammes).

M. Sig.: Spray, three to five minutes, morning and evening, or three or four times a day.

Gendre²⁹⁶ treated the persistent bronchitis of influenza with turpene and balsam of Tolu, of each $1\frac{1}{2}$ grains (0.10 gramme), six or eight times daily, or he prescribed the following formula:—

R Turpene, 30 grains (2 grammes).
 Tar, 30 grains (2 grammes).
 Balsam of Tolu, 90 grains (6 grammes).
 Benzoate of sodium, q. s. ut ft. pil. no. lxxx.

Sig.: Take six to eight pills daily.

Haug²⁴ summarizes the treatment of the aural complications as consisting in inflation of the tympana, the use of gargles, inhalations, insufflations, together with the administration of antipyrin, phenacetin, and quinine. In the exudative form, when the pain was severe, local blood-letting in the temporal region, ice-bags behind or about the ear, and, in some cases, iodine locally to the mastoid, formed the treatment. Subsequently, if paracentesis could not be performed, warm instillations into the external auditory canal were made hourly. If pain increased and the temperature rose, while exudation was detected in the middle ear, with pain and sensitiveness in the mastoid region, paracentesis afforded the greatest relief. Then, inflation was practiced, the canal syringed with an antiseptic solution and packed with gauze. Subsequent secretion was removed with cotton. Insufflation of powders is objectionable in these acute perforative cases, on account of obstruction from admixture of powder and pus.

Nothnagel¹¹⁴ recommends the faradic brush in the treatment of the neuralgias of influenza. The painful nerve is included between the two buttons of a brush especially constructed for the purpose, or between two ordinary wire brushes, kept stabile, and a faradic current, at first weak, but gradually increased in intensity. The application lasts from half a minute to two minutes. From eight to thirty *séances* are necessary.

GENERAL CONSIDERATIONS ON FEVER.

Cantani,⁹⁰_{Oct} at the Tenth International Medical Congress at Berlin, presented an able paper on the subject of antipyresis. He is not satisfied with the theory which makes the whole fever process dependent on certain nerve-centres. The local production of heat, the result of processes of chemical combustion, forms an essential factor. The action of nerve-centres may produce a temporary rise of temperature, but not a continuous or remittent elevation.

Fever must be looked upon as an acute alteration of organic metabolism, with increase of tissue combustion, and, consequently, also, of heat and consumption of body.

In some fevers, more heat may be retained, but the increased production of heat, the increased consumption of oxygen, and heightened combustion are the chief factors in the production of fever. Clinically, all fevers do not consume the combustible material of the body in the same manner and to the same degree, varying, probably, according to the different infecting agents. Thus, in malarial fevers and in acute articular rheumatism, many red blood-corpuscles are destroyed,—hence the anæmic appearance of persons recovering from these affections. In typhoid fever, the muscular tissue and, to a less degree, the nervous system suffer, explaining the great debility and emaciation which follow these diseases and the continued loss of weight during the first days of convalescence. In tuberculosis, all tissues and organs suffer; the whole body wastes; even the heart becomes smaller and the vessels narrower; only the nervous system remains intact; the patient often preserves his whole nervous energy and goes about up to the last days of his life.

Fever can be reduced in one of two ways. Excessive consumption can be diminished either by the withdrawal of heat or by a diminution in the production of heat. Withdrawal of heat does not combat the fever itself. To diminish the production of heat, various remedies have been used,—quinine, digitalis, salicylic acid, carbolic acid, kairin, thallin, antipyrin, phenacetin, and others.

Fever is a general reaction of the organism to changes in metabolism and in the blood, produced by the causative agent of the disease. This reaction is necessary to bring about cure. The

temperature alone is not a measure of the gravity of the disease. A moderate degree of fever may be due to a want of reactive power on the part of the organism, a high degree to the energy with which the organism defends itself against the invasion of the disease. The fever itself, therefore, has a favorable effect and may be of use in various ways: by diminishing the vitality or virulence of the living causes of disease and by raising the temperature of the tissues and of the blood; by increasing the power of resistance of the tissue elements in their phagocytic activity; by altering the nutritive soil in the tissues and rendering it less favorable for the growth and development of the germ of disease: in fact, by sterilizing the body. Fever, therefore, may be useful as long as the consumption of tissue does not give rise to exhaustion. The proper remedies for fever would be such as act on the cause of the disease. In this way quinine acts in malaria, mercury in syphilis. The antipyretic remedies, as antipyrin, have no special action on the cause of fever. They lower temperature by increasing radiation of heat from the body, and diminish heat production. They do harm by interrupting the course of the fever, diminishing the means of defense of the human organism, for a diminution in the production of heat is equivalent to a diminution of the vitality of the human organism and of the power of resistance.

High temperature, however, is not always useful in disease. The cardiac muscle may suffer or the nervous system be threatened. Under these circumstances, a reduction of temperature is desirable, if, by abstraction of heat, heat production is not diminished. The various hydiatic measures, such as cold baths, the cold pack, cold douches, the administration of large quantities of cold water, either by the mouth or by enema, act in this way. They absorb a large amount of heat from the body, whilst they rather augment the formation of heat. It is not known if the good effects which these remedies produce are due to increased tissue waste and elimination of excrementitious matters, including ptomaines and leucomaines. Certain diseases, attended with high temperature, are often successfully treated with diaphoretics, which cause an increased excretion of noxious matters, but which scarcely, if at all, increase heat production.

The conclusion reached by Cantani is that fever is an essential and, to a certain degree, a beneficial reaction to acute disease.

For certain fevers there are specific remedies, which attack the cause of the disease itself. There are, however, no general antipyretics. The most that can be done is to diminish the accumulation of heat in the febrile body without lowering the production of heat. To effect this, the hydriatic remedies can be recommended, whilst the chemical antipyretics must be looked upon with suspicion as general remedies for fever.

Armand, Gautier, Hayem and Schutzenberger, ¹⁰_{Nov. 12, '98}, a commission appointed by the Académie de Médecine to investigate the results announced by Roussy on the pathogenesis of fever, referred to in the ANNUAL of last year, have repeated the principal experiments of that investigator, and find them precisely as described. Roussy ¹¹⁰_{Apr.} has made a further communication on the subject, in which he delineates the following line of investigation: After detailing the preliminary experiments, suggesting that the pyretogenic properties possessed by putrid fluids are due to soluble chemical substances, he successfully demonstrates by experiments that infusions of the living yeast-plant possess pyretogenic properties as energetic as those of putrid fluids; that the mechanical action of microbes alone is incapable of producing fever; that the cellules of the yeast-plant secrete the chemical pyretogenic substances. Finally, an extract of the specific pyretogenic substance contained in infusions of the yeast-plant was obtained, to which the name of pyretogenin was given, and of which the physical, chemical, and physiological properties were studied. Pyretogenin is described as a special basic molecule, organic, highly nitrogenized, and a diastase of great energy.

Wood and Marshall, ²_{Aug. 10}, in a paper on the "Relation Between Fever and Urea Production," read at the Tenth International Medical Congress, at Berlin, deny that it is proved that increased elimination of urea is an integral part of the febrile process. Such increase might be accidental or secondary,—a result, perhaps, of high temperature. Bodily temperature and increased production of urea do not keep pace with one another. At critical periods in fevers the temperature may be low, but the elimination of urea increased. This indicates that the relation is between heat dissipation and heat production. Frequently, at critical periods, low temperature co-exists with an enormous increase of heat production. In hepatic fever it was found that the excretion

of urea was greater on the days on which there was fever than during the intermissions. In 2 cases of intense fever following section of the medulla, in which heat production was universally augmented, the elimination of urea was almost arrested.

Charrin and Roger¹⁰⁸ made a series of investigations to determine the influence of fatigue in the production of infectious disease. A number of white rats were subjected to excessive exercise (running in a rotating cage) for seven hours of each of four consecutive days. Eight of these animals and four others were then inoculated with attenuated anthrax virus. Seven of the eight succumbed, while all of the four control animals survived. Perhaps in this way may be explained the epidemics which break out among soldiers engaged in actual service.

Botkin,⁵⁸⁸ as a result of three hundred observations upon 7 cases of typhoid fever, 2 of typhus, 1 of malaria, and 2 of croupous pneumonia, found that variations in the constitution of the gastric juice were not dependent upon the nature of the disease. The most marked change was the diminution of the general acidity, with especial diminution of free hydrochloric acid, which in most cases was entirely wanting. Elevation of temperature is associated with diminution of hydrochloric acid, with but few exceptions. Neither is there any relation between the chemical constitution of the gastric juice and the appearance of the tongue, on the one hand, and the appetite during convalescence and deranged activity of the bowel upon the other.

In acute febrile diseases, the variations in the constitution of the gastric juice depend upon the severity of the attack and the resistance of the individual. After being absent during the stage of fever, hydrochloric acid appears suddenly in large amount, to diminish again in a few days, finally becoming normal. Botkin considers this variation analogous to the critical sweats and increased elimination of urine at the close of acute febrile diseases. Lactic acid was always present, sometimes, however, only in traces. On account of deficiency of hydrochloric acid, the amount of albumen coagulable on heating was small. The reverse was the case with propeptone. When, however, fever was high and loss of strength marked, the amount both of propeptone and coagulable albumen was small. When hydrochloric acid was present, digestion of a slice of boiled egg was active; when the acid was absent, digestion

took place only on the addition of hydrochloric acid and pepsin. If pepsin alone were added to gastric juice which contained little hydrochloric acid, digestion was retarded. The changes which take place in the constitution of the gastric juice in the course of febrile affections may be thus summarized: the hydrochloric acid first disappears, then the rennet-curdling (lab) ferment; lastly, the amount of pepsin diminishes, but never entirely disappears.

As a result of observations made at the clinic of Kahler, at Vienna, upon the respiratory interchange of gases during fever, Kraus¹¹⁴_{v.18,Nov.1,2} has arrived at these conclusions: It is possible for fever to exist without apparent increase of processes of oxidation. Such a condition may be found in cases in which fever has existed for a long time with marked emaciation. In cases of infectious disease of short standing, the increased consumption of oxygen, making allowance for respiratory variations, does not exceed the normal more than 20 per cent. Qualitative alterations in febrile tissue change do not materially influence the respiratory co-efficient, which is dependent upon the bodily condition.

In a series of observations, Hammerschlag²⁷³_{v.27,Dec.8} found free fibrin ferment in the blood, not only in 12 of 19 febrile patients, but also in 2 of 5 non-febrile cases. From this it would appear that the presence of free fibrin ferment is not necessarily provocative of fever.

Angel Money⁶_{Dec.7,78} states that he frequently finds the spleen enlarged in children under 2 years of age, not marantic, rhachitic, or syphilitic, when catarrh of the bronchi or of the intestines exists. He considers the spleen an erectile organ, and believes "that temporary splenic tumefaction is in infants (under 2) about as useful in the differential diagnosis of disease as is a temperature of 101° F. (40° C.)."

Slight Continued Fever.—Pepper¹¹²_{Dec.78} refers to the occurrence of a slight continued fever in certain susceptible individuals, with failure of the general health, weakness, loss of flesh, and pallor, out of all proportion to the local conditions. In some there may be slight derangement of the digestive apparatus, while in others the signs may be significant of the beginning of the changes in the vessels and organs which, unrestrained, finally lead to the condition of arterio-capillary fibrosis. The treatment requires the abatement of the local condition, a judicious arrangement of the diet, with a

nice adjustment of rest and exercise. In the cases in which vascular changes are suspected, blisters over the heart and the course of the great vessels, with administration of salicylates and iodides, are recommended.

GENERAL TREATMENT OF FEVER.

Klemperer,⁴ at the Ninth Congress for Internal Medicine, discussed the relation between the treatment of fever and the alkalinity of the blood. A theoretical distinction is to be made between an antithermic action—an influence upon the temperature merely—and an antipyretic action—an influence upon the causes of the high temperature. The determination of the alkalinity of the blood is a certain index of the presence of toxic substances which cause elevation of temperature, and which are of acid reaction. The more abundant these substances, the greater the diminution of the normal alkalinity of the blood. Antipyrin and antifebrin lower temperature, but do not affect the alkalinity of the blood.

As a result of a series of forty-two thermometric and calorimetric observations upon dogs, Mosso²⁷³ v. 20, No. 5, 6 rejects the existence of a special heat-centre, and believes that the body temperature may be raised either as a result or independently of nervous disturbance. Injuries of the cortex cerebri, of the corpora striata and lenticular nuclei, and of the thalamus opticus were followed by slight transitory elevation of temperature, explicable by other conditions. The administration of antipyrin in these cases exerted no perceptible influence upon the temperature. Abstraction of a large quantity of blood was followed by elevation of temperature, scarcely influenced by preceding administration of antipyrin. Elevation of temperature induced by intra-venous injection of cultures of the staphylococcus pyogenes aureus was temporarily reduced by the administration of antipyrin, but was not influenced by injury of the cerebral centres. Injections of cocaine produced elevation of temperature, unaffected by the administration of antipyrin.

Calorimetric observations demonstrated that the bodily temperature is not determined by the degree of heat radiation, but by the degree of heat production. The elevation of temperature following abstraction of blood and that following injection of cocaine are results of influences acting upon the nervous system, while the elevation of temperature following injections of the staphylococcus aureus are independent of any influence upon the

nervous system. In the one case, the fever is of central origin; in the other, of peripheral origin.

Maragliano¹¹⁴_{v.17, Nov. 24} records the results of a series of investigations as to the state of the vessels in fever and in antipyresis. Kairin, antipyrin, thallin, salts of quinine and salicylate of sodium were used in the experiments. It was determined that antipyretics in general caused vascular dilatation, which continued in the case of fever as long as the influence continued.

Cantani³⁵⁷_{Sept. 15} recommends the ingestion of large quantities of cold water and the administration of ice-water enemata in certain febrile conditions. In typhus, better results are obtained from the first; in typhoid, from the second. The cold exerts a direct effect, while, by absorption, the blood throughout the entire vascular system is influenced and the excretion of urine is greatly increased. Three to 6 to 10 grammes ($\frac{3}{4}$ to $1\frac{1}{2}$ drachms) of tannic acid and 10 to 50 centigrammes ($1\frac{1}{2}$ to $7\frac{1}{2}$ grains) of crystallized carbolic acid, with or without 1 to 2 grammes ($\frac{1}{4}$ to $\frac{1}{2}$ drachm) of quinine, may, with advantage, be added to each enema.

Richardson³⁸_{Aug. 10} records the case of a woman with symptoms of peritonitis and a temperature of 109° F. (42.77° C.), in which he withdrew 22 ounces of blood from a vein of the arm after antipyretic remedies had been freely administered without avail. The temperature fell to 101° F. (38.33° C.), and for a time the urgent symptoms were relieved. The improvement continued for about four hours, when, despite assiduous treatment, the temperature again rose to 109° F. (42.77° C.), and death soon followed. The clinical lesson to be derived from this observation is that, while the removal of blood has the effect of reducing the febrile heat, it does not control the process of zymosis on which the febrile condition itself depends.

Diakonoff¹⁰⁰_{May} as a result of observations upon 7 patients to whom about $12\frac{1}{2}$ cubic centimetres ($2\frac{1}{2}$ minims) of alcohol were given four times a day, ten or twenty minutes before meals, has arrived at the following conclusions: 1. Alcohol diminishes the assimilation of the nitrogenous constituents of the food in habituated as well as in non-habituated persons, though the effect is more pronounced in the latter. 2. Alcohol impairs the appetite, increases the daily quantity of fæces, and lowers the quality of the latter. 3. Alcohol retards disintegration of proteids in the system.

4. In cases in which the assimilation of proteids falls but slightly, alcohol diminishes the metamorphosis of nitrogenous substances; when the assimilation falls considerably, the metabolism increases. 5. Alcohol augments the daily excretion of urine, but lessens the cutaneous and pulmonary transpiration. 6. Alcohol improves the subjective condition. 7. Diminishing systemic disintegration of proteids, alcohol is a powerful adjuvant in controlling febrile affections. 8. As a good diuretic, alcohol promotes the elimination of suboxidized products and prevents their accumulation. 9. Any unpleasant influence of alcohol on the digestion is compensated for by various beneficial effects.

ENTERIC (TYPHOID) FEVER.

Etiology.—Almquist⁸⁴ Sept. 27; Oct. 4 presents a thoughtful paper upon the occurrence of epidemics of typhoid fever in localities which have long been free from the disease. No single factor will explain its spread. It may be carried in the water-supply, or in the milk-supply, or have a local origin in an imported case. The etiology of the disease has not yet been entirely cleared up, while but little is known of the biology of the organism related to it.

Peter,¹⁰⁰ Oct. 14, 21 in two brilliant lectures, attacks the theory of typhoid infection by means of drinking-water, and insists upon the recognition of two factors, which he deems of greater importance than the bacillus, namely, the epidemic constitution of the year and the temperament and present mental and physical condition of the individual. He cites cases in which different persons under similar surroundings were differently affected, and dwells upon the epidemic at Bourg, in which cases of "gastric embarrassment" preceded the outbreaks of enteric fever, and in which no bacilli were found in the drinking-water until late in the course of the epidemic. Allen, of Melbourne,¹⁰⁰⁰ records the occurrence of an epidemic of typhoid fever at Melbourne in the spring of 1879. The son of a milk-man died in the course of an illness presenting the symptoms of typhoid fever. Of ninety-three households supplied with milk by the milk-man in question, typhoid fever occurred in twenty-three. Forty individuals were attacked, of whom three died. From a study of the epidemic from various aspects, Allen concludes that contaminated milk was the cause of the outbreak, that the contamination resulted through some connection with the

excretions of the milk-man's son, and that the occurrence of typhoid fever in those who drank the milk depended upon certain other conditions, not determinable.

Taylor,⁷⁸⁷_{May} Medical Inspector State Board of Health, Wyoming District, reports an epidemic of typhoid fever in Wilkesbarre, Pa., and adjacent boroughs, during the second half of 1889, in which about 700 persons were affected, with some sixty deaths. Observation disclosed the fact that the disease prevailed among those who partook of water from a special source, while others, supplied from a different source, escaped. Boiling the water produced an evident salutary effect. Valid reasons are given showing why the epidemic was not a result of defective sewerage, of the use of infected ice, of exhalations from the streets paved or torn up, or from a filled-in canal, or from covered bog-ponds, or of contaminated milk. The original source of infection, however, could not be located.

Almquist,⁵⁸_{Feb. 18} reports an epidemic of typhoid fever in one of the provinces of Sweden during the summer of 1889, originating, in all probability, from the milk-supply. In the middle of the month of June, typhoid fever suddenly appeared in a community of 3000 inhabitants. The cases were pretty widely distributed, but it was discovered that those attacked received their milk from the same dairy, a recent establishment. The milk of the day, received from various sources, was all placed in a common receptacle and the cream separated. All who became ill in June were found to have partaken of milk from this dairy. It was also discovered that a woman living in the district had, since a month, been suffering with some febrile affection, probably typhoid fever, and that a child in the same house, a month earlier still, had had some febrile disorder. These 2 cases were probably the starting-point of the epidemic; 104 cases, with 11 deaths, occurred in less than four months. At the end of the month of June the use of the suspected milk was stopped and the epidemic subsided, to break out again in the middle of July. Granting a period of incubation of two weeks, the greatest number of infections must have taken place during the first two weeks of June and in the first half of July.

Herbert E. Smith,¹⁸⁸_{Oct} was detailed by the Connecticut State Board of Health to investigate an epidemic of typhoid fever at Waterbury. It was discovered that the cases were limited to

families which received their milk-supply from a farmer in whose household there had been 3 cases of the disease. The sewerage and the water-supply were excluded as sources of the infection. P. Ernst ⁷⁶⁸_{R. S. H. I. ; Sept. 19} ⁵⁰ reports the case of a child born prematurely of a mother sick with enteric fever, which, on the fourth day of extra-uterine life, suddenly ceased its hitherto continuous crying, became intensely jaundiced and covered with a mottled exanthem from the lower extremities to the lower portion of the abdomen. It died the same day. The autopsy revealed icterus, intense injection of the gastric mucous membrane, and moderate acute enlargement of the spleen. Cultures from the spleen and the blood of the heart showed in two days colonies of typhoid bacilli. Numerous bacilli were found in every arterial lumen of the Malpighian bodies of the spleen. Many bacilli were found in the spleen-pulp, often intra-vascular. Some days before delivery, the mother suffered an injury, which possibly caused a lesion of the placenta, with passage of bacilli into the foetal circulation.

Statistics. — MacDonnell ⁹_{Sept. 4} presents conclusions arrived at from a study of 100 cases of typhoid fever observed at the Montreal General Hospital. He found the average age of patients 24.8 years. There were 16 fatal cases. He holds the disease directly communicable. The rose rash was present in 51 per cent. of cases. He thinks the appearance of the tongue diagnostic and prognostic. Meteorism of serious import. In 5 of the 16 fatal cases the spleen was found enlarged, but in only 7 of the 84 non-fatal cases. Diarrhoea was the exception, constipation the rule. Intestinal hæmorrhage occurred in 2 of the 16 fatal cases, but in neither was it severe, nor did it appear to be the cause of death. On the contrary, all the cases in which severe hæmorrhage occurred recovered. Headache was almost always present during the first half or third of the disease, and disappeared spontaneously. Delirium is thought to be of grave import. The average duration of non-fatal cases was 40.8 days. Retention of urine occurred in 7 of the 84 non-fatal cases and in 4 of the 16 fatal cases. Incontinence of urine and fæces was troublesome in 2 cases, neither of which was fatal. Epistaxis was not serious in any case. Venous thrombosis occurred in 2 non-fatal cases. Relapse occurred in but 1 case. Perforation was found in 1 fatal case. One pregnant woman with typhoid fever aborted and died. No particular line

of treatment was followed. Hyperpyrexia was treated by cold sponging.

Association with Other Diseases.—An editorial¹² quotes the results of certain investigations of Kinyoun, who, in a number of patients, found the plasmodium malariae in the blood and the bacillus of Eberth in the stools. It has long been known that malaria and typhoid fever may co-exist in the same patient, the symptoms of one or the other disease, for the time being, predominating. For these cases the name typho-malaria was invented. Kinyoun proposes the modification, entero-malarial. Furniss⁶⁴⁷ summarizes the replies received in response to three hundred letters of inquiry addressed to medical men in Alabama, as follows: Fevers are not so prevalent now as they were formerly; the period of greatest prevalence was during the years 1881, '82, '83, and '84. The largest numbers of cases occurred during the months of May and October. The types were classified variously as typho-malarial, continued malarial, simple continued, with typhoid complications. The majority, including the ablest practitioners, found typhoid the most common, while the clinical history, the symptoms, the duration, and the treatment supported this view. In the few autopsies reported, the characteristic lesions of typhoid fever were found. The majority believed that the fevers were produced and propagated by a common cause. Intestinal hæmorrhage occurred in about 7 per cent. of cases. In the majority of cases, it occurred at the end of the second or during the third week, and was fatal in 66 per cent. of cases in which it took place. Quinine was found useless in treatment, which was principally expectant. Johnston,⁹ in a paper on "The Continued Fevers of the South," read before the American Medical Association, thus summarizes the conclusions at which he has arrived: 1. Enteric fever is a rare disease in the South, in a typical or intense form. 2. There is a probable change going on in the type of enteric fever; it is losing its typical character, and is assuming a less typical and milder form. 3. Many cases of mild continued fever, which have no well-defined or characteristic symptoms, are cases of mild enteric fever. 4. While malarial continued fevers are found in the South, many so-called cases of "adynamic malarial fever," "remittent fever," etc., are, in reality, cases of enteric fever. 5. There is no good reason to believe that there is such a disease as typho-malarial fever.

Pathology.—Meigs,⁹_{Nov. 15} in the annual address delivered before the Philadelphia Pathological Society, emphasizes the view that typhoid fever is not primarily a disease of the intestines. Microscopic examination of lung, heart, liver, spleen, kidney, ileum, mesenteric glands, and spinal cord revealed various changes. Hæmorrhage, fibrinous and catarrhal exudation, round-celled infiltration, and thrombosis were found in parts of the lung. There were evidences of endocarditis and of myocarditis, with degeneration of and hæmorrhage into the muscular structure of the heart. The liver presented inflammation of its interstitial structure and cellular degeneration. Sections of the spleen stained poorly. The ordinary lymphoid cells were replaced by much larger multinucleated cells. The kidneys were in a state of cloudy swelling, with desquamation of the glomerular epithelium. The intestines presented the usual infiltration and ulceration of Peyer's patches. There seemed to be an increase of the neuroglia of the spinal cord, especially marked in the columns of Goll in the cervical region, to the detriment of the nerve-fibres.

Kamen,⁵⁷_{Jan. 19, 98} as the result of a bacteriological investigation of a fatal case of enteric fever, with acute meningitis, concludes that the sole infective agent producing the meningitis was Eberth's bacillus, and that we are justified in speaking of typhoid meningitis, meaning thereby a specific inflammation of the meninges.

A case of typhoid fever is reported by Loriga and Pensuti,⁵⁸⁹_{Dec. 25, 98} in which left-sided pleurisy with effusion developed. Thoracocentesis was performed, and careful bacteriological examination resulted in the discovery of the bacillus of Eberth in the fluid.

Lucatello,⁵_{Oct. 29} reported, at the Third Italian Congress for Internal Medicine, 12 cases of gastric fever of infectious origin, in which bacteriological examination detected the presence of typhoid bacilli. As a result, he concludes, that, in some instances, acute gastritis with fever is due to an expression of mild typhoid infection.

Klemperer,⁶⁰_{Dec. 25, 98} before the Verein für innere Medizin, reported a fatal case of typhoid fever, complicated by vomiting and diarrhœa. Death occurred on the fifteenth day. The vomiting resisted medicinal and dietetic treatment. The autopsy revealed two small, longitudinal ulcers on the lesser curvature of the stomach and a diphtheritic colitis.

Pérignon,²²⁰_{July 1} reports a case of typhoid fever in a woman,

aged 28, in which a relapse occurred, with fatal issue, the primary attack being complicated by intestinal hæmorrhage. The autopsy revealed, in addition to a perforation of the small intestine, with peritonitis, the ordinary ulceration, the enlarged spleen, ulceration of the stomach, and ulceration of the large intestine, from the cæcum to the rectum.

His, of Leipzig,⁴ reports a fatal case of typhoid fever in a man of 20, in which intestinal hæmorrhage and repeated chills occurred. At the autopsy, the small intestines were found in the pelvis, covered by intestinal contents, the large bowel enormously distended. A small perforation was found on the posterior aspect of the transverse colon, while numerous vesicles, containing air, existed on various parts of the colon beneath its serous layer, and the mesocolon was infiltrated with air.

A case of rupture of the spleen, reported by Santi Flavio,⁵⁰⁵ is quoted¹⁷ as a sequel of typhoid fever. A man of 20 was admitted to the hospital with typhoid. At the end of ten days he was taken with severe pain at the base of the right side of the chest. Pleuro-pneumonia was found, followed by an exudative pleurisy, necessitating thoracentesis. In the course of two months the patient was attacked with severe pain in the left hypochondrium, aggravated by palpation in the region of the spleen. The formation of a splenic infarct was suspected, probably of the same origin as the pulmonary complication. The action of the heart was rapid and exceedingly feeble, and œdema of the left lower extremity indicated the existence of venous thrombosis. There was a period of improvement, when the patient was suddenly seized with the severe pain of peritonitis and succumbed. The autopsy revealed, in addition to peritonitis, a rupture of the enlarged spleen, with diffusion of its puriform substance in the cavity of the peritoneum. A recent infarct was found in the neighborhood of the site of rupture. The right kidney also contained an infarct. In the intestines were found the cicatrices of previous ulceration.

Romberg, of Leipzig,⁴ reports a fatal case of typhoid fever in a laborer, aged 34, complicated by abscesses of the liver. The course of the disease was severe, intestinal hæmorrhage taking place. Repeated chills occurred, followed by jaundice. Meteorism was marked and enlargement of the liver was detected. The autopsy disclosed ulcers in process of healing in the lowest portion

of the ileum, and suppuration in the mesentery at a corresponding situation. Throughout the liver were found large numbers of miliary abscesses. A thrombus occluded the portal vein and its branches. Abscesses of the liver in the course of typhoid may result (1) from ulceration of the biliary passages, (2) from purulent pyelephlebitis in conjunction with ulceration of the bowel, and (3) as a result of pyæmic infection from any other source.

Complications.—Carslaw,^{6 July 18} reports a case of typhoid fever in a nurse of 23, in which four relapses occurred, with ultimate recovery. The initial attack lasted thirty-four days; the first relapse, twenty-three days; the second relapse, twenty-two; the third, sixteen; and the fourth, ten days. There was an interval of three days between the termination of the primary attack and the beginning of the first relapse; of fifteen days between the termination of the first relapse and the beginning of the second; of ten days between the termination of the second and the beginning of the third; and of sixteen days between the termination of the third and the beginning of the fourth. The illness lasted, in all, one hundred and forty-nine days. In the primary attack, there were marked nervous symptoms, albuminuria, and intestinal hæmorrhage, while in the interval following the third relapse there was phlegmasia alba dolens of the left leg.

In a lecture, Laporte,^{24 July 27} discussed the cardio-vascular complications of typhoid fever. In addition to the degeneration of the muscular structure of the heart, endocarditis has, in rare cases, been observed. There may occur during convalescence a transitory arteritis, having a special predilection for the lower extremities. Obliterating arteritis has been observed in the upper extremities, in the temporal and Sylvian arteries, and even in the aorta itself. Inflammation may attack the aorta or the semi-lunar leaflets and be followed by insufficiency. The symptoms of these various conditions are localized pains, modifications of pulsation, and the auscultatory phenomena.

Peter,^{100 Nov. 18} at a clinical lecture, presented a case of myocarditis developed during an attack of typhoid fever. The patient was seized with a sudden, acute pain in the præcordium, with tenderness in the same region, and, on auscultation, a systolic murmur was heard at the apex. The complication is a grave one.

Drewitt,^{6 Nov. 15} reports a case of typhoid fever in a girl of 12, in

which gangrene of the left lower extremity, below the knee, set in. Amputation was performed above the knee. The main artery of the amputated member contained a red, friable, loosely-adherent clot, extending to the division into the posterior tibial and peroneal. Below this the arteries were empty. The child eventually made a good recovery.

Girode¹⁵²_{July} reports a case of typhoid fever, with albuminuria, in a neurotic girl of 17, in which the eruption appeared on the twentieth day following the supposed commencement of the attack. During the progress of the case, the patient passed eighteen lumbricoid worms, four by the mouth, the remainder by the bowel. At the decline of the fever, a cervico-brachial phlebitis developed, manifested by swelling of the entire upper extremity, extending to the side of the face, with pain, tenderness, discoloration, œdema, and local elevation of the temperature. Rusty sputum, blowing breathing, and subcrepitant râles indicated the occurrence of pulmonary infarction.

Chew⁹_{Oct. 11} reports 4 cases of femoral thrombosis occurring in the course of typhoid fever, in each of which the vein occluded was on the left side, and makes reference to 3 others of the same kind reported by Da Costa.⁹_{Sept. 1, '00} He suggests, as an explanation of the frequency with which the left side is the seat of the disturbance, that there may be some anatomical abnormality of the femoral and iliac veins of that side.

Arnaudet²⁰⁸_{Nov. 1} reports 3 cases of phlebitis of the calf of the leg, occurring during the subsidence of typhoid, 1 in a woman of 75, another in a woman of 50, and the last in a man of 38. The first was on the left side, the other 2 upon the right. All the cases recovered.

Imredi³⁶⁵_{Oct. 25} reports a case of enteric fever complicated with left hemiplegia in a man 26 years old. The case had been diagnosed as influenza, and the patient sent out to walk on the fifteenth day. He suddenly lost consciousness and remained unconscious for several hours. Being brought to Kéti's clinic, the muscles of the left side were found to be paretic in varying degree. The fever ran a course characteristic of enteric fever, and splenic enlargements, rose spots, diarrhœa, decubitus, and abscess formation were noted. Recovery took place. Imredi considers it cerebral hæmorrhage, and could find only 15 similar cases in literature.

Keim⁷⁸⁷ reports a fatal case of typhoid fever in a boy of 9, in which gangrene of the left cheek occurred during convalescence. Reference is also made to 2 other cases.¹¹² At a meeting of German naturalists and physicians, Helferich²⁴ reported that in five years he had observed 8 cases of disease of the ribs, in association with, or as a sequel of, typhoid fever. The cartilaginous portion of the rib usually suffered. In half of the cases, but one rib was involved; in the remaining half, more than one. Pain and swelling appeared over the diseased area, which became adherent to the skin, which ultimately broke, leaving a fistula lined by granulations. The general condition is rarely affected. Recovery may take place spontaneously, but is facilitated by curetting and cleaning. Helferich considers this chondritis a direct result of the typhoid infection. As it occurs in persons of mature age, he considers the changes in the cartilage a predisposing cause.

Leudet²⁰⁸ records a rare and interesting case of painful œdema of the thorax, during convalescence, from enteric fever. The patient first complained of pain in the neighborhood of the thyroid gland. Tender spots in the neck seemed to be situated in the course of the left pneumogastric and phrenic nerves. Pain in the region of the shoulder-blade was caused on motion of the arm. A few days later, there developed a strictly circumscribed œdema on the left side of the thorax. It embraced an area extending inferiorly to the seventh rib, superiorly to within a short distance from the nipple, and laterally from nearly the nipple line to the line of the inferior angle of the scapula. This area was not reddened, but was painful upon pressure. There was no fever and no albuminuria. The œdema began to subside in about four days, and by the twelfth day had completely disappeared.

Goldstein⁵⁷ reports the occurrence of erythema exudativum in the course of typhoid fever, in a smith aged 32. In the third week of the disease, innumerable elevated spots, varying in size from a pin-head to a lentil, with a central nodule, appeared over the entire body, especially upon the thorax, back, and arms. The spots were red in color and well defined, except upon the back, where they gradually faded into the uninvolved skin, and disappeared upon pressure. The pharynx, the soft palate, the uvula, and the tonsils were injected, and slight conjunctivitis existed.

The centre of the patches became excavated, and the patch itself bluish from centre to periphery, finally fading entirely. The case was progressing favorably, when, following a severe paroxysm of cough, hæmoptysis and epistaxis occurred. A day or two later, the skin and visible mucous membranes were found covered with petechiæ. Recovery ultimately took place. Microscopic examination of the erythematous areas disclosed a round-celled infiltration of the layer of the corium immediately beneath the epidermis, but no bacteria were found.

Grüder,^{50 Feb. 17} in an inaugural dissertation upon ulcerations of the larynx in typhoid fever, describes three varieties. The first is the so-called specific typhoid ulceration, occurring at the same time as the ulceration of the bowel, and only in situations where follicular structures are present, as on the anterior aspect of the posterior wall of the larynx, at the base of the epiglottis, on the aryepiglottic folds. Bacteriological investigations failed to detect the presence of the typhoid bacillus on these ulcers. In the second division, there are catarrhal manifestations, with a tendency to ulceration. The mucous membrane is reddened and swollen. The epithelium desquamates and erosion takes place. The ulcer may extend down to the cartilage. The catarrhal ulcers seated at the margin of the epiglottis are included in a separate subdivision. They rarely occur singly. The ulceration frequently extends to the pharynx. Diphtheritic ulcers make up the third division. Infiltration is succeeded by necrosis and exfoliation. The prognosis is grave.

Larcher^{88 Nov. 4} records a case of sudden death from pulmonary embolism following typhoid fever. The case had been one of only moderate severity in a woman who had previously been pregnant. A thrombus formed in a hypogastric vein, from which a bit became detached and swept into the pulmonary artery. McGannon,^{1 Oct. 18} before the Medico-Chirurgical Society of Montreal, related the history of a girl of 14, in whose family there were cases of typhoid fever, who, though ill, continued her house-work until within a few days of her death. She was feverish, but without serious symptoms. Sudden death occurred by syncope. There was no autopsy.

Spleno-Typhoid.—At the Tenth International Medical Congress at Berlin, Eiselt,^{3 Aug. 27} described, under the name of spleno-typhoid, a variety of typhoid fever in which the spleen bears the

brunt of the infection, while intestinal complications are wanting. He makes three sub-varieties. In the one, the spleen is voluminous, and there is perisplenitis, adhesive or exudative, localized or involving the peritoneum. In the second, the spleen rapidly attains a size sometimes enormous, with, now and then, an effusion of blood into the splenic pulp. The fever is intense and continuous, and lasts for from six to seven weeks, giving way for from eight to ten days to apyrexia, to return and continue as long as the tumefaction of the spleen. In the third variety, the spleen is large, the fever intense at the beginning. Apyrexia, of several days, sets in at the end of a week, to be followed by fever, this again by apyrexia, and then by fever. Spirilla have never been found in the blood in these cases. That they are cases of typhoid fever is demonstrated by the origin of the contagion and by intestinal ulceration found in fatal cases.

Diagnosis.—Simon ⁷⁶_{Nov.} reports having tested the urine of a number of healthy persons, and of patients with various diseases, by means of Ehrlich's method. Only in cases of typhoid fever and phthisis pulmonalis was the reaction obtained, and in only 4 of 26 cases of typhoid fever did he fail to obtain it. In making the test, two solutions are employed, one containing 50 cubic centimetres (8 minims) of hydrochloric acid, water sufficient to make 1000, and sulphanilic acid to saturation; the other, a $\frac{1}{2}$ -per-cent. solution of nitrite of sodium. Forty cubic centimetres ($6\frac{1}{2}$ minims) of the first and 1 cubic centimetre ($1\frac{1}{2}$ minims) of the second are well shaken together. The action of hydrochloric acid upon the nitrite of sodium forms nitrous acid, which, in the presence of sulphanilic acid, forms diazo-benzene-sulphonic acid. Originally, the mixture was added to the urine in equal parts. If the urine thus treated is overlaid with an excess of ammonia, a ring of color varying from carmine or garnet to eosin forms at the junction of the two. Subsequently, the method was modified by adding to one volume of urine five or six of absolute alcohol, filtering, and then adding the sulphanilic-acid solution.

The color of urine, from a non-febrile case, remains unaffected or merely becomes intensified, when ammonia is added. When the urine contains biliary coloring matters, an intensely dark, cloudy discoloration occurs, which becomes reddish violet on boiling.

If there be any doubt of the reaction the mixture is shaken. In case of typhoid fever the foam which forms has a reddish color, or a greenish sediment forms after standing for from twelve to twenty-four hours.

Neumann, in an address delivered before the Berlin Medical Society, ⁴_{Nov. 10} recommends examination of the urine for typhoid bacilli in doubtful cases of typhoid fever. He made 114 observations in 48 patients, and found bacilli in 11. The urine, obtained by a sterilized catheter and received into a sterilized tube, was examined microscopically and cultures made. Germs are not present in urine from a healthy bladder. When typhoid bacilli are present, they occur in large numbers. Viewed in a hanging drop, the urine contains many motile bacilli. This observation must be confirmed by plate cultures. The bacilli of typhoid fever appear in the urine only when the kidney is directly involved. At about the same time as the roseola appears, colonies of bacilli form capillary emboli, which give rise to reactive inflammation. Hence it would be useless to examine the urine for bacilli before this time. The number of bacilli in the urine seems to be in direct proportion to the intensity of the eruption. The appearance of the bacilli has no bearing upon the prognosis, nor is it at all related to nephritis.

Karlinski ⁵⁹⁹_{Nov. 29, 30} has examined the kidneys and urine in 6 fatal cases of enteric fever and the urine in 38 other cases of the same disease. Bacilli were found in all the kidneys examined. In 21 specimens of urine Eberth's bacilli were found, all these urines being albuminous. When albuminuria was transient or absent, no bacilli were found. Sometimes the bacilli appeared earlier in the urine than in the stools. Colonies rapidly increased in albuminous urine and preserved their vitality for a long period. In urine containing bile the bacilli died in five days. Bozzolo ⁴¹_{Aug. 28} considers bacteriological examination of the blood of great diagnostic importance. In 3 atypical cases, he was able to find Eberth's bacillus and thus determine that he was dealing with typhoid septicæmia.

England, of Montreal ¹⁸⁰_{Nov.} has reported a case of typhoid fever in a hand-fed infant 8 months old. There was vomiting, slight diarrhoea, tympanites, enlargement of liver and spleen, typical rose spots, and febrile elevation of temperature, for a period of three

weeks. Other cases of typhoid fever occurred in 3 pupils at a school in which the father of the infant was principal.

Treatment.—Teissier⁵⁵ reports 15 consecutive cases of typhoid fever treated by naphthol α , of which 14 recovered, the fatal case being complicated by influenza and purulent nephritis. Six grains (0.40 gramme) of naphthol (alpha), with a little salicylate of bismuth, were given morning and evening. Four cold enemata were administered in the course of twenty-four hours. The afternoon enema was followed by a rectal injection of 60 grains (4 grammes) of the extract of cinchona and 9 to 15 grains (0.60 to 1 gramme) of sulphate of quinine in an infusion of valerian. In addition, 10 ounces (300 grammes) of Bordeaux wine, milk, and bouillon were given. Observations directed to that point demonstrated that naphthol (alpha) diminished the production of toxins in typhoid fever, as manifested by their presence in the urine, probably by neutralizing the toxic substances produced by the bacillus of Eberth.

Cahall⁹ reports 16 cases of typhoid fever treated with salol in powder, 3 grains (0.20 gramme) every two hours, with an average duration of seventeen days. All recovered. The only untoward effect was partial suppression of urine in some cases. Axtell¹⁵⁵ treated 36 cases of typhoid fever exclusively with bichloride of mercury, $\frac{1}{20}$ grain (0.003 gramme) three times a day, with but 2 deaths. One of the fatal cases was complicated with Hodgkin's disease and the other with melancholia. H. C. Wood⁹ credits George B. Wood with the original recommendation of turpentine in typhoid fever. There are two periods at which the remedy is indicated. The first is at the end of the second week, when the tongue is dry and glazed, and there is tympanites, with or without diarrhoea. The second is during convalescence, when impaired digestive power and diarrhoea indicate the persistence of intestinal ulceration. Ten or fifteen drops may be given every two or three hours.

R Ol. caryophylli, ℥vj (0.40 gramme).
Ol. terebinthinæ, f℥iss (6.00 grammes).
Glycerinæ,
Mucilaginis acaciæ, ℥ss f℥iv (16.00 grammes).
Syrupi, f℥j (80.00 grammes).
Aquæ, q. s. ad f℥iij (90.00 grammes).

M. ft. emulsio.

Sig.: ℥ij (8 grammes) every two or three hours.

Lereboullet,³ before the Société Médicale des Hôpitaux, reports for Sorel 105 cases of typhoid fever treated by sulphate of quinine and salicylate of sodium, with 5 deaths. Some patients were given warm baths.

Geissler,⁵⁸⁸ of St. Petersburg, as a result of the treatment of 5 selected cases of typhoid fever by means of enemata of hot water, has arrived at the following conclusions: 1. Enemata of hot water exert a favorable influence upon the intestinal tract in typhoid fever; when diarrhœa exists, the frequency of the stools is diminished and their quality improved; abdominal pain is relieved, and constipation, when present, is overcome. 2. Immediately after an enema, the temperature slightly rises; an hour later, it has fallen. 3. The injections seem to promote defervescence, or to transform a continuous fever into a remittent or intermittent one. 4. Immediately after an enema, the frequency of the pulse diminished, to increase at the end of an hour; the pulse becomes firmer and fuller, its dirotism less pronounced, the cardiac contractions more vigorous. 5. The respiration quickens, to become slower in about an hour. 6. The blood-pressure rises. 7. The daily excretion of urine increases, the specific gravity falling. 8. There is diminished cutaneous and pulmonary transpiration. 9. The enemata are well borne.

J. H. Jenkins¹⁸⁶ reports a case of repeated and profuse intestinal hæmorrhages in the fourth week of enteric fever, in which 1 quart of blood was transfused directly from the common carotid artery of a lamb into the brachial vein of the patient at the bend of the elbow. Immediate improvement was noticed; the pulse, which had been almost imperceptible, becoming fuller and stronger, respiration becoming less labored, nervous disturbances ceasing, and the patient falling into quiet and refreshing sleep. Sixteen days after the operation the patient was able to sit up.

The Brand treatment seems at last to be winning its long-deferred recognition as the method *par excellence* of managing enteric fever. F. E. Hare, resident medical officer, Brisbane Hospital, Australia,¹⁰⁰⁰ describes the method as pursued at that institution, and notes in detail its favorable influence upon circulation, respiration, digestion, secretion, excretion, and nervous phenomena. He states that delirium and stupor frequently disappear in the first bath, almost always after the first few days'

treatment. Headache is always relieved, but returns with the rise of temperature. Sometimes the immediate result of the bath is to increase the pain, but this can always be avoided by sponging the head with ice-cold water before immersing the body. Insomnia is almost unknown. Most patients require to be waked for the bath. This may seem cruel, but the aggregate of sleep is increased by it. Diarrhœa is at first increased, the patient having a stool after each bath, but this soon ceases. Meteorism is greatly lessened. In a later communication, the same observer²⁶⁷ compares the mortality in 1828 cases during the period of expectant treatment (271=14.8 per cent.) with that in 171 cases during a period of incomplete bath treatment (21=12.3 per cent.) and 797 cases during the period of strict bath treatment (56=7.0 per cent.). In the latter group, 15 fatal cases should be deducted. In 6 of these, the bath was deemed inapplicable either on account of old-standing organic disease, or because they were in an advanced state of prostration from complications, and 2 were not diagnosticated during life. As to the other 7, 4 died in less than forty-eight hours and 3 in less than seventy-two hours. Excluding these, 782 cases gave a death-rate of 5.2 per cent. Of 464 cases not bathed, 5.2 per cent. died from hæmorrhage or perforation, *i.e.*, conditions due to the intestinal lesion. Of 968 cases, including 797 bathed, 4.2 per cent. died from the same causes. There is a slight but actual decrease. The reduction of nearly 10 per cent. in the general mortality is due to the avoidance of such causes of death as toxæmia, asthenia, pneumonia, coma, and other conditions due to the febrile state. Before bathing, the mortality from pneumonia alone was about 2 per cent. Among cases bathed it was only 0.05 per cent.

Devic²¹¹_{Aug. 17} treated 81 cases of typhoid fever in children and infants with cold baths. The ages of the patients were from 2½ to 14 years. Twenty-five were light cases, 12 of moderate severity, and 14 very severe. Two of the elder children died from the intensity of the infection. One very young patient died of a rare complication, purulent pericarditis following a purulent bronchopneumonitis. The mortality was thus 3.7 per cent. The duration of the baths was ten minutes, the temperature 20° C. (68° F.)

West,⁷ as a result of investigations made in collaboration with Roque, bearing upon the elimination of toxic matter in the urine of typhoid-fever patients treated by cold baths, reaches the

following conclusions: 1. In typhoid fever treated by the method of Brand the elimination of toxic matters in the urine, measured by means of intra-venous injection of urine into rabbits, showed a decided increase. The mean of quantities eliminated is to the normal as are 2.5, 2.6, 2.8 to 1. 2. The urotoxic coefficients are increased in greater or less degree from the time of giving the bath to the eighth or tenth hour after. From this time, it remains for several hours at a pretty constant level, to descend progressively to the normal. The curves which represent the intensity of the urotoxic coefficients sometimes present irregularities, owing either to a temporary depression of the ascending line, which corresponds to a transient aggravation of symptoms, or to sudden elevation of the descending line which precedes convalescence.

The maxima of elimination correspond sometimes to the period of numerous baths, sometimes to that of infrequent baths. The action of the bath is immediate, but the baths exercise also a distant influence which continues into convalescence, even after they have been withdrawn. The urotoxic curves and those which indicate the quantities of urine passed in twenty-four hours are not parallel. A high degree of polyuria may correspond with a small urotoxic coefficient and inversely. Diuresis is, then, not the principal agent governing the elimination of poisons in the urine.

TYPHUS FEVER.

Hlava,⁸³² in 20 of 33 cases of typhus fever examined post-mortem, and in 2 of 10 examined during life, found, in addition to streptococci and other micro-organisms, common in secondary infection, a peculiar, well-defined bacterium, to which he gives the name of streptobacillus. It was present only in the blood. The rounded variety resembled the streptococcus pyogenes; the oval, the pneumonia bacillus of Weichselbaum-Fraenkel. Injections into mice, rabbits, cats, and pigeons were followed by no result. Young pigs responded with acute febrile manifestations and a red exanthem. Hlava thinks it not improbable that the streptobacillus in question may be the cause of typhus fever, though absolute proof is wanting; and further, that it is not impossible that the streptobacillus may be the carrier of a secondary infection. He believes typhus fever to be the result of a mixed infection, like diphtheria, small-pox, scarlet fever, and typhoid, arising only by direct contact.

MALARIAL FEVERS.

Etiology.—Laveran ⁴⁵⁷_{Nov., '99} describes the various forms of organisms found in the blood in cases of malarial infection. The most common are colorless, transparent, spherical bodies, of variable size, the largest having a diameter as large as or slightly larger than red corpuscles, capable of amœboid movement, free or adherent to red corpuscles, and usually containing granules of pigment. Attached to the spherical bodies or free in the blood, are delicate, tenuous bodies,—flagella,—difficult of detection in repose, but more evident when engaged in active movement. The crescent-shaped bodies are free, transparent, colorless, having a length a little greater than the diameter of a red corpuscle, and contain, usually at their centres, granules of pigment. The extremities of the crescents are sometimes united by fine lines. In addition to the preceding, spherical bodies, pigmented at the centre, and regularly segmented rosettes are sometimes found in the blood of malarial patients. These observations have been amply confirmed, and the labors of Laveran have received the recognition which they deserve.

Laveran, ⁸_{June 22, July,} before the Société de Biologie, in discussing the question as to the plurality or the polymorphism of the organisms of malaria, presented various objections to the former view. He is unwilling to admit that the quotidian is not a distinct type of fever, but merely the result of a tertian or quartan, or that the crescents are never found in the blood of patients with tertian or quartan. Based upon his observations, Laveran believes the organism polymorphous, but single, and its evolution not always the same. The crescents appear in old cases,—in those who have had several attacks or present the malarial cachexia. The type of fever depends upon the condition of the subject, his excitability, his tolerance of the miasm, and upon the form of parasite in the blood. Certain analogies exist between the hæmatozoa of birds and those of malaria, both probably belonging to the same species. Their identity, however, is doubtful, presenting, as they do, various morphological differences. Laveran was not able, by repeated examinations, to find hæmatozoa in the blood of birds which received intra-venous injections of blood containing large numbers of malarial organisms.

Of 85 cases of malarial fever, Terni and Giardini ⁹¹⁹_{May 18} found

crescents in 62 of irregular course, while in but 1 did they find the parasite of tertian fever described by Golgi. The crescents were present in 12 cases of malarial cachexia, in 1 accompanied by the parasite of tertian fever. In the remaining cases—9 of quartan and 2 of tertian—they found exclusively the respective organisms described by Golgi as characteristic of these fevers. Quinine proved efficacious in the last only. In cases in which these were associated with crescents, active treatment with quinine caused only the disappearance of the former. The unavoidable deduction is that the crescents can always be found in cases of malarial fever of irregular type.

Marchiafava,⁸⁴ at the Second Congress for Internal Medicine, at Rome, observed that the results of examinations of the blood in cases of malaria varied with the season. In summer, the parasites appear in the red and in the white corpuscles. The pernicious character of such cases is constantly associated with the presence of many amœboid bodies; in autumn, in addition to the latter, semi-lunar and filiform, ovoid and round parasites are found. The latter seem to be related to one another, representing various stages of the same organism. The amœboid bodies occasion fever of a diurnal type, or sub-continuous fever. The presence of the semi-lunar parasite does not give rise to fever, although the general condition of the patient is poor, and improves only upon the use of iron and quinine. In winter and spring, the amœboid body predominates. These cases recover spontaneously. Marchiafava and Celli have observed that at these seasons the amœboid parasite shows a tendency to disappear, either by phagocytosis or by disintegration. Melanæmia is the result of the influence of the parasites upon the hæmoglobin. The malarial parasite is a protozoön, and approaches in character the miatozoa; malaria is induced by its invasion. This can be demonstrated by transmission of the infection through the blood.

Golgi,⁸⁴ at the Thirteenth Congress of Italian Medical Associations, described the following febrile varieties of malarial fever: 1. Intermittent fever, dependent upon a parasite with a period of development of two days,—tertian and quartan. 2. Intermittent fever dependent upon a parasite having a period of evolution of three days,—quartan, double quartan, triple quartan. 3. Intermittent fever dependent upon the presence in the blood of parasites,

the significance of which has not yet been determined, which are developed periodically, and are known as semi-lunar bodies,—fever of indefinite intermittent type, with long intervals, daily and sub-continuous forms.

Diagnosis.—Osler ⁷⁶⁴_{Dec., '90} insists upon the diagnostic value of the presence of the corpuscles of Laveran in cases of malarial fever. In ordinary cases of intermittent fever, there is no difficulty in the diagnosis. The examination of the blood is particularly valuable in chronic and anomalous cases. The following are the most important facts concerning the organisms: In the acute forms of malaria there exist, within some of the red blood-corpuscles, amœboid bodies, usually pigmented, which undergo a definite evolution, increasing in size, gradually filling the corpuscles, and which, prior to and during the chill, undergo a peculiar segmentation. In some cases there are also free, pigmented bodies. To the form within the corpuscles, which undergoes changes, the name plasmodium has been applied. Occasionally, in acute cases, flagellate bodies are seen free in the blood, presenting from three to eight long, actively-moving cilia. According to Councilman, these are much more common in the blood withdrawn from the spleen. In more chronic cases, particularly in the forms of remittent fever, which are so apt to be taken for typhoid, the corpuscles do not so often present the intercellular forms, but there are remarkably ovoid, rounded, and crescentic bodies, deeply pigmented. These are, in all probability, related to and developed from intercellular forms. From certain of these, particularly the ovoid and rounded forms, the flagellate bodies may be seen to develop.

Brandt ⁹⁰_{Sept. 25} reports a case of much interest from a diagnostic point of view. In consequence of grave cerebral symptoms, with evidence of previous injury to the head, the question of surgical interference arose. The detection of the parasite in the blood, however, cleared up the diagnosis, and energetic antimalarial treatment dissipated the symptoms. In other cases of coma, in which the diagnosis was in doubt, the detection of the organisms in the blood excluded other possible conditions. In still another case, the dissipation of the malarial fever revealed the existence of typhoid fever. The blood was examined in a number of cases known not to be malarial, but organisms were never found.

Complications.—Boinet and Salibert, ⁹²_{Nov. 10, '90} during a sojourn of

three years at Tonkin, observed a number of motor disorders of malarial origin: malarial paralyses proper; spasmodic affections, as tremor, choreic and ataxic movements; athetosis, convulsions, contractures, and muscular atrophy.

Malarial paralyses are transitory or permanent; the former always yield to quinine. They appear with the onset of fever, disappearing with it, or persisting a few days longer. They have the characters of cortical paralyses, rarely of spinal palsies. Permanent paralyses of malarial origin are not amenable to treatment by quinine, being the results of organic lesions of the nervous system. Spinal lesions are often accompanied by disorders of sensibility, sometimes by muscular atrophy, or even by tremor. Aphasia sometimes occurs in association with cortical paralysis of malarial origin. It is frequently associated with hemiplegia, monoplegia, or paraplegia. When there is hemiplegia or monoplegia, the paralysis usually is limited, complete, transient, easily cured, not progressive, variable in seat and intensity, of cortical origin. From these there may be various deviations. Aphasia may be accompanied by manifestations of spinal involvement, by paraplegia. In the case of the transient palsies, it is conceived that occlusion of a cerebral vessel by micro-organisms has taken place. The changes in the spinal cord due to malaria may be congestion, inflammation, softening or hæmorrhage. The latter is rare, and is probably due to the rupture of small vessels or of miliary aneurisms. Clinically, the paraplegias resulting from these conditions may be accompanied by muscular atrophy and cutaneous anæsthesia, or by tremor of the inferior extremities and of the head on voluntary movement. The paralysis may remain permanently; it may undergo improvement; it may be but transient; it may be repeated.

As a result of malarial intoxication, there may be rhythmical movements, in the form of tremor on voluntary motion. Sometimes the movements are choreic, sometimes ataxic. More rarely there is athetosis or spasmodic contractions. Finally, there may be convulsions or contractures. Muscular atrophy, in the course of malaria, may be spinal or peripheral. In the former case, a large number of muscles are affected. The symptoms and lesions are comparable to those of anterior poliomyelitis. If the atrophy be peripheral, it is limited to the distribution of one or more nerves.

Harlan⁹⁹ presented to the American Ophthalmological Society the history of a case of malarial cachexia with transient amblyopia and bitemporal hemianopsia. A sailor, aged 22, with chills, fever, headache, mania, and hallucinations, which failed to submit to quinine, lost vision in the temporal fields, and subsequently became entirely blind. Pigmented corpuscles were found in the blood. Continued administration of quinine caused rapid improvement, with return of normal vision and disappearance of the pigmented bodies.

Rouzier¹⁷ has collected a large number of observations of mild impaludism, in which a distinct systolic murmur was heard with greatest intensity at the apex, and not transmitted in the course of the vessels, in cases in which functional derangement and antecedent cardiac disease could be excluded. In 2 cases under observation for a considerable length of time, the murmur became progressively fainter. Post-mortem lesions are not often found. In cases, however, there have been alterations of volume, of consistence, of coloration of the cardiac muscles, hypertrophy or degeneration, exceptionally valvular lesions. Nicoletti⁵⁸⁹ reports a case of spontaneous rupture of the spleen in a boy of 15, who had had repeated attacks of intermittent fever while engaged in his work, which consisted in carrying heavy weights up a steep plane; the boy felt a sudden, sharp pain in the left hypochondrium, fell to the ground, and died in twenty minutes. At the post-mortem examination, a large quantity of bloody fluid was found in the peritoneal cavity, and in the left hypochondrium a clot as large as a child's head, surrounding the spleen, which presented a laceration at its anterior margin. The organ weighed 680 grammes (22 $\frac{2}{3}$ ounces). Its pulp was extremely friable.

Masked Intermittent Fever in Children.—Lewis¹¹² calls attention to masked intermittent fever in children, presenting itself in the form of bronchitis. A certain number of the cases were at first treated with chloride or carbonate of ammonium with little benefit, while immediate relief followed the administration of quinine, which, given tentatively to cases of ordinary bronchitis, produced no decided benefit. Many of these children had slightly enlarged spleens, and were quite pallid. Fever was recognized in only a few of the cases, while slight chilliness was more common. No distinct intermission in the bronchial symptoms was noticed. The

hæmatozoa of malaria were looked for in only a few cases, but were not found. In some of the cases, the diagnosis was arrived at only after careful investigation, aided by the fact that the majority came from a known malarious neighborhood.

The Urine in Malarial Fevers.—At a meeting of the Société des Sciences Médicales de Lyon, Roque and Lemoine²¹¹ reported the results of examinations in 3 cases of impaludism to determine variations in the toxicity of the urine. One case was a frank tertian, the other 2 were pernicious comatose forms. Death occurred in one of the latter during a paroxysm. In the case of tertian fever, examinations on three occasions of the urine, passed during twelve hours preceding the paroxysm, revealed a normal or subnormal urotoxic coefficient, while the urine passed during twelve hours following a paroxysm was hypertoxic. The urine passed during the first six hours following a paroxysm possessed a higher toxicity than that of the second six. The highest coefficient was obtained in the urine after the last paroxysm, eight hours in anticipation of which 23 grains (1.50 grammes) of quinine had been given. The other 2 cases had come from Algiers. In both, the urine contained albumen. The occurrence of these pernicious forms in those returning from paludal to cold climates is ascribed to diminution of the cutaneous functions. In addition, the renal lesion probably aggravated the condition by further diminishing the elimination from the blood of toxic matters produced by the paludal poison. In the 2 cases in question, the toxicity of the urine was at first *nil*. Subcutaneous injections of quinine, which produced permanent amelioration in one and only passing mitigation in the other, were followed by a hypertoxicity of the urine. As a result of their observations, Roque and Lemoine formulated the following conclusions: The paludal poison gives rise to toxic products in the blood, a large portion of which is eliminated by the kidneys. Elimination is at its maximum immediately after a paroxysm, and lasts, on an average, twenty-four hours, at least, in cases of tertian fever. Quinine acts in favoring and augmenting this elimination. In certain pernicious forms, without toxicity of the urine, dependent upon lesions of the kidney and of the liver, a return of urinary toxicity is of favorable augury. Recovery is preceded by an elimination of toxins in excess of that which occurs after an unintercepted paroxysm.

Treatment.—Charpentier³⁴⁵_{July} makes the following suggestions as to the administration of quinine in intermittent fever: As the action of quinine takes place six hours after administration, to obtain the maximum effect of a given dose, it should be given six hours before the attack. In quotidian fever the apparent onset of the attack is marked by the chill, but the actual commencement occurs two hours earlier. It would, therefore, be a mistake to administer quinine six hours before the chill. The right time would be about eight hours in anticipation of the chill. The varying length of the interval between the apparent and real commencement of the attack in the various forms of intermittent fever gives rise to the following rules: In quotidian fever the quinine may be administered eight hours before the chill; that is, immediately at the close of the preceding attack. In tertian fever the quinine may be administered twelve hours before the chill. In quartan fever the quinine may be given eighteen hours before the chill.

Quinine should be prescribed in large doses, as it is speedily eliminated by the urine. In case the stomach will not tolerate large doses, fractional doses may be given at brief intervals, so that the entire amount is taken in three quarters of an hour, or an hour at most.

Bacelli,⁸⁴_{Jan. 11} at the Second Congress for Internal Medicine, at Rome, stated that certain pernicious forms of malaria were fatal, despite the utmost care. For these he proposed the intra-venous injection of a neutral salt of quinine:—

R Quininae hydrochloratis,	.	.	.	gr. xv (1.00 gramme).
Sodii chloridi,	.	.	.	gr. j (0.07 gramme).
Aquae destill.,	.	.	.	℥iiss (10.00 grammes).—M.

This was injected into the veins in progressively diminishing doses. There were no untoward results. On the contrary, the pernicious character of the disease was dissipated.

A dose of 15 grains (1 gramme) of quinine does not suffice to abort a paroxysm when given at the outset or three hours before. Given at the height of the paroxysm, the quinine does not shorten the attack. Given at the close of, or after the paroxysm, quinine aborts the subsequent attack or diminishes its intensity in a marked degree. In the subcontinuous varieties, that time is the best for administering quinine at which a reduction of temperature has taken place.

Hunter, of New Orleans,⁴³ insists upon the efficacy of nitrate of potassium in the treatment of chills and fever. He claims to have cured 65 per cent. of his cases with a single dose; 35 per cent. were uninfluenced by repeated doses. The best results were obtained when the drug was administered during the premonitory stage, in anticipation of the paroxysm. It is said that 25 or 30 grains (1.63 to 2 grammes), given at this period, will abort the attack or modify its course and intensity. Sawyer¹ claims to have antedated the recommendation of Hunter by twenty-five years. He was induced to try the remedy after having been assured by a backwoodsman that a large dose of gunpowder (taken in whisky), at the beginning of the cold stage, would almost always abort or modify the malarial paroxysm, and attributed the result to the action of nitrate of potassium.

Johnson¹⁹ reports a case of quotidian intermittent fever in a man of 44, which resisted treatment by quinine, 3 grains (0.20 gramme) every three hours, preceded by a mercurial purgative, but submitted to 15 grains (1 gramme) of nitrate of potassium every three hours.

MILK SICKNESS.

At the Tenth International Medical Congress, at Berlin, Kimmel³⁹ read a paper on milk sickness, a disease met with in the central western portion of the United States. The affection seems to prevail in parts of the country newly opened to settlement, disappearing when the soil has been brought to a high state of cultivation. Animals are liable to contract the disease when they pasture late at night or early in the morning. The animal affected usually remains in one place or wanders about a limited area, holding the head to the ground. The appetite is impaired and constipation is the rule. Later, the animals present tremor, which continues for three or four days, at the end of which death occurs, although the disease is not invariably fatal. Oxen and bulls are affected, cows escaping as long as they give milk. The disease is contracted by man by drinking milk from cows of an infected herd. In man, the symptoms are constant, and the diagnosis, as a rule, easy. There is, at first, marked fatigue and languor, followed by anorexia, nausea, vomiting, pyrosis, obstinate constipation. Excessive thirst is a prominent symptom, though the fluids taken are rejected. There is neither elevation of temperature nor alteration

of pulse. The skin is dry, the tongue moist and coated. Respiration is difficult and sighing. The abdomen is retracted, but not tender. Delirium is rare. Prostration increases. The patient cannot move hand or foot. Even the eyelids become immovable. Death finally occurs in coma. As a rule, fatal cases last fifteen to twenty days. When recovery takes place, the duration is from five to ten days. Convalescence is apt to be prolonged and tedious. Milk sickness is distinguished from typhoid fever, malarial affections, and gastro-enteritis by the absence of fever. It may be complicated by malarial fever. Quinine, alcohol, and other stimulants are recommended in treatment. The disease in man can be traced to the use of milk or butter from cows pasturing with infected cattle. The disease is believed to be microbic, and the infecting parasite allied to that of malaria.

SOUTHERN CATTLE OR TEXAS FEVER.

Smith ⁹_{Dec. 21, '89} makes a preliminary report of observations made in the course of an epidemic of Southern cattle or Texas fever, in the latter part of 1889. He believes the disease infectious and of malarial type. Healthy cattle from North Carolina infected a small, inclosed patch of pasture at the Experiment Station of the Bureau of Animal Industry. The infection was maintained and increased in intensity after the removal of the animals which brought it. It did not spread. The animals attacked showed elevation of temperature, marked prostration, hæmoglobinuria, with diminution of the number of red blood-corpuscles. The spleen was enlarged, its pulp disorganized. The liver was yellowish brown in color, its parenchyma bile-stained. Many of the biliary canaliculi were plugged with consistent, cylindrical masses of bile. The liver-cells had partly undergone fatty degeneration. The bile was thick and viscid. The kidneys were suffused. In some cases, there were ecchymoses of the duodenum. Cultures of the blood and of fluid taken from various organs in different media were unsuccessful. Small, round bodies, however, were found in many red blood-corpuscles, situated centrally or excentrically, staining poorly in an aqueous solution of methyl violet, but very well in an aniline-water solution. They resemble micrococci in size and form. Unstained, they have the appearance of transparent spaces in the corpuscles. Besides the spherical

forms, ovoid bodies are not uncommon, occurring usually in pairs. A still rarer pear-shaped form is encountered in stained preparations of the blood. It is rounded at one pole and drawn out into a short filament at the other. These, also, almost invariably occurred in pairs. One other abnormal form was found in the blood. When dried cover-glass preparations were stained with Loeffler's alkaline methylene blue, the surface of a few red corpuscles appeared as if dusted with fine particles of coloring matter. As a rule, the circulating blood contained comparatively few parasites. They are filtered out by the spleen and liver. The organism may represent a phase in the life-history of some of the lowest mycetozoa, such as the monadineæ; or it may belong to the group of sporozoa, some of which are pronounced cell-parasites.

RELAPSING FEVER.

Pasternacki⁵⁸⁸ has arrived at the following conclusions as to the fate of the spirochetæ in the blood of patients with relapsing fever: The spirochetæ retain their form and activity at a temperature of 80° C. (176° F.), if not exposed longer than half a minute. An exposure of thirty minutes will kill them at 45° C. (113° F.). The movements cease and the organisms disappear from view. The fine and active granules found in the blood in cases of relapsing fever, during the first stage, resist not only the greatest hyperpyrexia, but also degrees of heat more than sufficient to coagulate the blood. In contrast to the spirochetæ, these granules appear to increase in number and activity with high temperatures. When granules and spirochetæ are simultaneously present in the blood in an occluded capillary, the simple granule outlives the complex spirochetæ. The motile granular bodies, arranged in from fours to tens, in chaplets or in rosettes, are not present in the blood in the early stage of relapsing fever, at the period of growth and development of the spirochetæ. They occur in large numbers when a closed tube containing blood from a case of relapsing fever is heated suddenly to a high degree or continuously to a lower degree. At the same time, the spirochetæ disappear. This suggests that the spirochetæ are transformed by the heat into the granular bodies. Although the gradual inhibition of their movements and the ultimate disappearance of the spirochetæ on the approach of the crisis are obscure phenomena, perhaps dependent

upon several causes, it is not impossible that the facts established by the investigations of Heidenreich and of Pasternacki as to the disturbing influence of high temperature upon the activity of these parasites may have some bearing upon their disappearance from the blood in the hyperpyrexia of the critical stage.

The investigations of Ssacharow ⁵⁸⁶ have led him to the following conclusions: Throughout the course of relapsing fever, a hematozoön, in some phase of development, is present in the blood. The disease may be diagnosticated, even in the apyretic period, by means of stained preparations of the blood. The morphological resemblance between the parasites of malaria and relapsing fever renders it probable that the latter, like the former, is miasmatic in origin. This resemblance also accounts for the parallelism of the symptoms of the two diseases. The spirochetæ of relapsing fever are not schizomycetes, but pseudo-spirilla.

DENGUE.

From his own observations during a long residence in Greece, and from other sources, Ornstein ⁵⁸⁷ arranges the symptoms of dengue as follows: The onset may be preceded by prodromes. At the beginning of the attack, the face and body are covered with an erythematous eruption, attended with itching, which, in the course of a few hours, assumes the characters of the rash of scarlatina, or measles, or urticaria. The exanthem lasts for from twenty-four to forty-eight hours. With its disappearance, the temperature remits, or becomes normal, for from two to four days, at the end of which time a secondary eruption appears, with moderate fever. In three days more, the crisis occurs, the symptoms recede, and desquamation of the skin takes place. In a small number of cases, relapses occur, even as many as three. Under such circumstances the disease may last for a month. The rash is the characteristic feature. There is also severe frontal, temporal, and deep orbital headache. Muscular and articular pains are conspicuous symptoms. The knees are favorite seats of invasion, giving the gait a peculiar, limping character. Nausea and vomiting, epigastric distress, heavily-coated tongue, bad taste, offensive breath, and complete anorexia are the signs of gastric derangement. At the beginning of the disease, the temperature, for two or three days, reaches about 104° F. (40° C.). There is

then a gradual decline, so that on the sixth day there is apyrexia. Other less significant symptoms are vertigo, mental dullness, insomnia, and hæmorrhages from mucous membranes. An abortive form of the disease is described. A curious antagonism has been observed to exist between the malarial fevers and dengue. The treatment throughout is symptomatic, except that antipyrin is said to be a specific for the pains.

Skottowe²¹⁸_{Sept.} reports an epidemic of dengue in Fiji during the year 1885. He repudiates the idea of an origin *de novo* or the explosion of latent conditions, but traces the probable lines of its importation. The period of incubation is brief, from a few hours to a week. The attack sets in suddenly, with rigors, flushes of heat, elevation of temperature, general uneasiness, pains in the limbs, back, and head. The temperature rises suddenly, and the pain becomes intensified. The face is flushed, the eyelids swollen, the conjunctivæ injected; the eyeballs ache; there is photophobia. The temperature reaches its acme on the evening of the first or second day. The pulse is rapid, the appetite impaired, the stomach irritable, the tongue dry, the skin hot and parched. There is great restlessness. The urine is scanty. The tongue becomes heavily coated. Albumen occasionally appears in the urine. On the third day, the prostration is extreme. The skin becomes moist; the initial rash appears, to pass away in twenty-four or forty-eight hours, with desquamation. The temperature falls, but remains febrile. The symptoms abate, pain diminishes, and general improvement takes place. Sleeplessness continues. In a day or two the temperature rises, and there is an exacerbation of the symptoms. A second eruption appears and lasts for two or three days, also to be followed by desquamation. Between the eighth and tenth days the temperature falls, with profuse perspiration. The symptoms moderate, but the prostration remains. Convalescence was tedious; slight attacks lasted two or three days. The symptoms were mild. The eruptions were evanescent or absent.

Maléas⁸⁴_{Dec. 22, '90} publishes an interesting paper on the dengue epidemic at Constantinople in June, 1889, in the course of which he had an opportunity of observing some 650 cases. The disease was at first not recognized. It was thought to be rheumatic fever, or intermittent fever, or gastric fever. Its rapid spread and further observation finally led to the diagnosis of dengue. The author

has no doubt of the contagious nature of the disease. Warmth and moisture are necessary to the development of the noxious agent which gives rise to the disease. The epidemic under consideration occurred during a hot summer following a rainy spring. With the advent of cold weather the disease dies out. The infection seems to have no predilections as to individuals, race, sex, age. Children, especially infants, are said to be more resistant than adults. Among the complications may be hæmorrhages from various surfaces, insomnia, neuralgia, diarrhoea. Cases do not die directly of dengue. Quinine is useless in treatment. Antipyrin or salicylate of sodium may be used for the pain. The muscles and joints may be rubbed with liniments. Cocaine and chloral locally may relieve the itching. During convalescence bitter tonics may be prescribed.

An elaborate memoir upon the epidemic of dengue at Constantinople, during the summer and autumn of 1889, was prepared by a commission composed of Mahé, Mordtmann, and Ritzo, and presented to the Imperial Society of Constantinople at a meeting held June 20, 1890.

Guelliot⁵⁷⁷ graphically describes the points of resemblance and contrast of dengue and influenza. Both have in common a brusque invasion, rapid elevation of temperature, lumbar pains, muscular pains, and cephalalgia.

Lumbar pains and prostration are present in influenza, it is true, but in dengue they dominate the disease, lasting from beginning to end, and persisting long after all other symptoms have disappeared. It is difficult to describe the physical breaking down, the intellectual debility, the moral disorganization that dengue brings with it, and which may persist for weeks after the illness has entirely disappeared. In influenza, there may be suffusion of the face, perhaps œdema; rarely, however, the transient erythema of dengue, approaching in its characters a scarlatiniform rash. In dengue there is a distinct eruption, active, different in different subjects, which may be raised into papules, followed by desquamation and itching for several days. The painful phenomena have certain analogies in the two affections. In influenza, there is pain in the side, often accompanied by retrosternal pain, with a sense of oppression; in dengue, an incessant restlessness from a desire to find a position in which the pains may be avoided. In dengue, the con-

valescence is prolonged and tedious, and attended with debility, incapability for exertion, capriciousness or loss of appetite; while, in influenza, convalescence is more rapid, and unattended with such complications. The respiratory involvement of influenza is wanting in dengue. Dengue is a benign disease *par excellence*. Who can say as much of influenza? Guelliot himself had dengue and grippe at an interval of five months.

Skottowe²¹³_{Sept.} says that there are many points of resemblance between dengue and relapsing fever. In dengue, however, the fever only remits, vomiting is rare, eruptions are the rule, pregnant women do not abort, nor has a spirillum been found.

VARIOLA.

Etiology.—Fleming,²²_{July 30} while admitting the inter-relationship of the variolæ of various animals, denies their identity. Though, by transmission from one species of animal to another, they may be modified in their clinical features, in accordance with the nature of the soil in which the virus is implanted, when re-transferred to their own native soil they exhibit all their original distinctiveness and individuality. In addition, the virus of one may protect from or antagonize the virus of another. The variola of sheep presents the closest resemblance to the small-pox of man, but the two are not identical. The one will neither produce nor protect from the other. Horse-pox can be inoculated in the cow and in man, in one instance producing cow-pox, in the other vaccinia. Small-pox, however, is not transmissible from man to the lower animals. Neither can Fleming find any analogy between cow-pox and human syphilis.

Hillmantel⁷⁷⁹_{Dec., '89} reports an epidemic of small-pox at Missoula, a town in Montana, between August 2 and October 23, 1889, during which 19 cases occurred. The histories of 13 in which recovery took place are given, but it is not stated whether there were any fatal cases or not. The author himself was inoculated through an abrasion of the skin, being compelled to go to bed for two days, the site of inoculation becoming indurated and a vesicle forming at the spot. The adjacent glands were swollen and painful, the temperature rose to 102°, and there were headache, backache, and general malaise. The origin of the epidemic could not be traced.

Classification.—Huchard³_{April} proposes the following classifica-

tion: varioloid, characterized by an absence or moderation of the fever of suppuration; discrete variola, characterized by a limited number of pustules (thirty to forty) on the face (the clinical index of the case); coherent variola, in which the pustules are in contact, but not fused, with one another; confluent variola, in which the elements of the eruption run into one another from the beginning; primary hæmorrhagic variola; secondary hæmorrhagic variola. Based upon this classification, Huchard deduces the following conclusions as to prognosis: recovery always occurs from varioloid; discrete variola may assume gravity from complications, but usually terminates in recovery; coherent variola and secondary hæmorrhagic variola are grave conditions, not necessarily fatal; confluent variola and primary hæmorrhagic variola are always fatal.

Complications.—Chiari²_{May 31} has examined the testicles of 62 patients with small-pox,—in 13 during the period of eruption, in 28 during that of suppuration, in 14 while desiccation and desquamation were taking place, and in 7 during convalescence. In 45, orchitis was present. Examined microscopically, the testicles presented three zones, corresponding to those of the variolous pustule: a central zone of necrosis, a middle zone of infiltration and cell degeneration, and an outer zone of exudation. As suppuration does not occur, absorption must take place. Chiari concludes that, since orchitis is so common in small-pox and the lesions are so similar to those in the skin, the inflammation of the testicle is a specific manifestation of small-pox.

Balzer⁸²⁴_{May} reports the case of an anæmic and cachectic woman of 23, with intense secondary syphilis, in whom vaccination was followed by a local slough, with the formation of an eschar, which only disappeared after the administration of large doses of iodide of potassium. Balzer's explanation was that a syphiloma developed at the site of vaccination.

Treatment.—As a means of favorably influencing the pustules of variola, so as to reduce to a minimum the risk of cicatrices, Talamon³¹_{Apr. 17} has applied ethereal solutions of various antiseptics by means of a spray apparatus. He rejected iodoform on account of its odor, and tannin because of the painful contraction to which it gave rise. Salol does well only when the eruption is slight and scanty. In all other cases, corrosive sublimate is to be preferred. Talamon uses a solution containing—

Corrosive sublimate,
 Citric acid, aa 1 gramme (15 grains);
 Alcohol (90 per cent.), 5 centimetres (8 minims);
 Ether, sufficient to make 50 cubic centimetres (1½ ounces);

which may be sprayed three or four times a day until desiccation takes place. An application of a minute usually suffices, the eyes being protected by tampons of cotton squeezed out of a saturated solution of boric acid. In the intervals, glycerole of corrosive sublimate (1 to 15) may be applied. In grave cases of variola, and in those in which the eruption is confluent, the patient is given tepid baths, 30 grammes (1 ounce) of corrosive sublimate being added to the quantity of water usual for a bath. When the mouth and pharynx are the seats of eruption, antiseptic gargles should be used. To prevent or modify the formation of disfiguring cicatrices in small-pox, Bertrand¹⁰⁰_{July 16, 17} recommends the application, by a brush, of a mixture of 4 grammes (1 drachm) of boric acid to 50 (1½ ounces) of glycerin, as soon as the eruption appears, either on the face or in the pharynx. The eyes are bathed with a tepid saturated solution of boric acid.

YELLOW FEVER.

Etiology.—Sternberg,¹_{July 15} in a paper read before the New York Academy of Medicine, stated that extended researches as to the etiology of yellow fever, made during the preceding two years by the most approved bacteriological methods, gave only negative results. Most of the organisms found were not peculiar to yellow fever, being also found in cases in which death had taken place from other causes. He found one bacillus, however, in sections of the liver and in the contents of the intestine, in cases of yellow fever and under no other circumstances. Though not successful in obtaining satisfactory experimental evidence, he rather looked upon this as possibly being the specific germ of yellow fever.

Treatment.—After using a number of drugs in the treatment of yellow fever at the Isthmus of Panama with indifferent results, Thorington⁵_{Feb.} tried cocaine to overcome the nausea and vomiting, to which, in most fatal cases, death was due, and obtained gratifying results. Of 20 cases thus treated, 3 died, while the mortality previously had been about 50 per cent. The diuretic properties of cocaine commend its use in yellow fever, as suppression of the urine is a complication to be feared. The drug is best given in

solution, on an empty stomach, and in anticipation of an attack of nausea. Ferreira, ⁶⁷_{Mar. 20} reasoning from the conception of yellow fever as an intoxication from the intestinal canal, recommends the use of salol, in doses of $4\frac{1}{2}$ grains (0.28 gramme) every two hours, as an internal antiseptic, and reports 2 cases thus treated in which black vomit had already appeared and in which recovery resulted.

Gaston ⁶¹_{Mar. 22} maintains his defense of the method of inoculation of Freire in the prophylaxis of yellow fever, and presents comparative statistics compiled by Freire. The first sporadic cases of the epidemic of 1888-89 appeared in the month of May, 1888, the last in June, 1889, while the epidemic attained its greatest intensity between December and March. Three thousand five hundred and twenty persons were inoculated, of whom 988 were strangers and 2532 Brazilians. Among the latter were 1680 from the interior, residents of Rio de Janeiro for less than six years, and children. The mortality was 0.79 per cent. Among those not vaccinated there occurred 4115 deaths [it is not stated among how many cases], of which about 2800 were in strangers and about $\frac{1}{4}$ in Brazilians. From 1883 to 1889, 10,480 persons were inoculated; from 1883 to 1884, 418; from 1884 to 1885, 3057; from 1885 to 1886, 3473; from 1888 to 1889, 3532, with a mortality of 4 per cent. The inoculations were interrupted during 1887 and 1888 because of the absence of Freire in Europe and the United States. Sternberg ⁶¹_{July 20} attacks these statistics as liable to convey false impressions. Using the figures of Freire, he is able to demonstrate that the mortality among the inoculated was really greater than among those not inoculated. He quotes an exposition of the fallacy of Freire's conclusions, presented to the Academy of Medicine of Brazil, and the opinions of the president and of a member of the Central Board of Health criticising the work of Freire. It is shown that in one instance the inoculations were made late in the epidemic, when the survivors had already evidenced their insusceptibility to the disease.

MALTA FEVER.

Before the Epidemiological Society of London, Gipps ⁶_{Mar. 3} read a paper on "Malta Fever," which, he maintained, was a specific disease generated by the foul condition of the harbor. It was most prevalent during the hotter months, when putrefaction was active. The crews of vessels, anchored for six months of the

year, suffered far more than the garrison, and the disease, when occurring among the troops, was mostly contracted in crossing the water. It seemed distinct from the remittent fever common to other ports of the Mediterranean. It only appeared on board vessels recently stationed at Malta, and within the incubation period of fourteen days. The term typho-malarial was to be deprecated because there were no intestinal lesions or intermittent features. The disease set in with malaise, headache, severe lumbar pains, fever; the temperature rising from 101° F., on the first day, to 104° F. (38.33° to 40° C.) or upward, with a daily range of 2° or 3°; perhaps bilious vomiting and diarrhoea, succeeded by constipation. The tongue remained coated, but moist. The duration of the fever was from a few weeks to several months. When convalescence set in, recovery was rapid, and was assisted by removal to a better climate. The mortality did not exceed 2 per cent. In some cases, death occurred within the first week. In these, the liver and spleen were greatly enlarged. The most troublesome complication was a quasi-rheumatic affection of the muscles, of the lumbo-sacral nerves, and of the periosteum, especially around the tibia. These tended to spontaneous cure and yielded speedily to treatment at one of the German baths. In the treatment of the fever itself quinine did harm. Symptoms were combated as they appeared.

WEIL'S DISEASE.

Werther ⁶⁹_{Deu. 24, '98} presents an analysis of 71 cases of Weil's disease, collected from the literature on the subject. In cases under observation from the first day, the maximum temperature occurred on the first or second day. The temperature was high also on the third and fourth days. The ascent was rapid. The fastigium lasted one day. A notable remission took place during the night, between the fourth and sixth days. Subsequent defervescence was by lysis. In addition to headache and vertigo, there were mental dullness, feeling of malaise, marked debility, and, sometimes, somnolence. At night, there were fear and restlessness. Muscular pains, especially in the thighs, and hyperæsthesia were usually present. There were excessive thirst and disgust for food. The pulse was, at first, frequent, often small, not rarely dicrotic. The frequency of respiratory movement was marked, the lungs being healthy. Nausea and vomiting were present, usually at the

beginning of the attack. Diarrhoea was more common than constipation, the stools not always being clay-colored. The spleen was enlarged in many cases, the liver in a smaller number, with or followed by jaundice of variable duration and intensity. The excretion of urine was diminished, with albuminuria in many cases, and in a small number with casts. Œdema never occurred. The function of the kidneys was always resumed. In the cases in which the amount of urea excreted was measured, the lowest point was reached at the height of the fever. Herpes and exanthemata were not rare. The tendency to hæmorrhages, epistaxis, hæmoptysis, hæmatemesis, bloody stools, purpura are indications of the general infection. Among the complications were parotiditis, a peculiar variety of "bilious" pneumonia, iridocyclitis, and pareses. But little is known of the pathological anatomy of the disease. The liver-cells are degenerated, the interstitial tissue inflamed. The disease occurs sporadically or in limited epidemics, especially during the summer months. It is more common in males than in females, young adults especially suffering. Soldiers and butchers seem especially predisposed to the disease. The active agent is thought to be a product of the decomposition of organic matter, which gains entrance into the system through the gastro-intestinal tract. Mazzotti⁵⁷ has reported 15 cases of Weil's disease under his own observation. Ten recovered; 5 died. In the latter, he found granular and fatty degeneration of the liver-cells, with evidences of interstitial hepatitis, without catarrh of the gall-ducts and without obstruction to the flow of bile; degeneration of the renal epithelium, with indications of interstitial nephritis. In 2 cases there was swelling of the salivary glands. Acute onset, fever, jaundice, swelling of liver and spleen, nephritis, nervous symptoms, brief duration, favorable outcome, relapse, tardy convalescence constitute the clinical picture.

From post-mortem examination of 3 fatal cases of Weil's disease, Sumner⁵⁸² concludes that there exists, in certain portions of Europe, an acute infectious disease, sometimes sporadic, sometimes epidemic, presenting well-marked nervous manifestations, enlargement of the spleen and of the liver, derangement of the functions of the kidney, and manifested clinically by jaundice, muscular pains, and albuminuria. The disease is more common in males than in females, and relatively so in young adults. It

occurs especially in the summer months, and in the majority of cases terminates, at the end of from seven to eleven days, in recovery. In fatal cases, acute inflammation of kidneys, liver, and lungs is found.

PSILOSIS.

Thin,²_{June 14} describes as psilosis a condition common in Batavia, and known in the East as Indian sprue, in which the tongue is fissured and ulcerated, its mucous surface, as well as that of the œsophagus and of the small and large intestine, being in places destroyed. The disease is insidious in its onset and chronic in its course. It is attended with difficulty in swallowing, with diarrhœa, and with loss of weight. There is a peculiar fluctuation in the symptoms, which improve greatly upon a milk diet, to recur upon indiscretion. The lesions are supposed to be due to disease of the superficial blood-vessels. The etiology has not yet been determined.

NEGRO LETHARGY, OR SLEEPING SICKNESS.

At a meeting of the London Clinical Society, Mackenzie²⁹_{Nov. 19} presented a case of "negro lethargy," or the "sleeping sickness," an almost always fatal disease occurring in full-blooded negroes on the West Coast of Africa. It attacks both sexes alike and occurs at all ages, but is most common between 12 and 18. No distinctive morbid appearances have been found after death, nor is the etiology of the disease known. The symptoms indicate an affection of the higher nervous centres.

Mackenzie's case occurred in a married negro of 22, with two children, who had always lived on the Congo and many of whose relatives had fallen prey to the fatal malady. He had come to England for treatment. The disease was preceded by an attack of diarrhœa, which lasted a month; there was an inclination to drowsiness at times during the day, and a slight drooping of the eyelids; muscular power was impaired; the gait was tremulous and tottering; on one occasion, the patient lost consciousness, had high temperature and sweated profusely; on two occasions, the urine contained albumen; *filarie sanguinis hominis* were at all times found in the blood; the patient began to lose flesh and strength; irregular pyrexia was observed; the mental condition became torpid and lethargic; the patient slept for many brief periods, the total amount of sleep not exceeding that usually taken by healthy people.

SCARLET FEVER, MEASLES, AND RÖTHELN.

By LOUIS STARR, M.D.,

AND

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PHILADELPHIA.

SCARLET FEVER.

Etiology.—S. H. Miller ⁵⁹_{May 94} reports 24 cases of scarlet fever from drinking milk. In the latter part of last January, the daughter of one of the dairymen of Brewster, N. Y., went to the city for a visit. The next day after arriving there she was taken sick, manifesting the symptoms of scarlet fever. It was a mystery to her parents as to where or how the disease had been contracted. Two weeks after her recovery her attending physician stated that it would be safe for her to return home, which she did. Two weeks later, March 11th, her next younger sister, who slept with her, had her first symptoms of scarlet fever. The case was reported, the health officer visited the house, quarantined it, and his first and most emphatic injunction was that the dairy business should be conducted entirely away from the house; that nothing should be taken from the house to the dairy. All went well till April 4th, when a number of cases of the fever started in different parts of the village. One adult and two children in each of two families were taken at about the same time, so that, on the 6th, 12 cases were reported. The health officer at once suspected that the milk had been infected. A thorough investigation showed that every one who had the fever had drunk the milk, and not one who did not drink it was affected; that at the quarantine his orders had been scrupulously obeyed; but that the milkman, however, had washed and wiped his cans with white flannel cloths taken from rags left in the barn by a rag-peddler. After delivering the milk on the morning of the 7th, this man was not allowed to sell any more, and after the 8th no new

cases of scarlet fever occurred till the 18th and 19th, when 2 cases started in the same families where it had been introduced by the milk, and no other cases have occurred up to the time of writing (April 25th). From April 4th to 8th, 24 cases developed directly from drinking the milk. The stage of incubation in every one of these cases seemed to have been less than twenty-four hours, and the first symptoms in most of the cases were very severe,—intense pain in stomach and bowels, excessive vomiting, and a profuse diarrhoea. After these symptoms nearly every case ran a mild course, without a death. The facts altogether seem to indicate that the dairyman's children, in the first place, contracted the fever from the rags, and from the same source the milk became infected.

Incubation.—At the Hungarian “Wander-Versammlung” in Groswarden, Bókai (Buda-Pesth) ⁶²²_{v. 36, p. 200; Oct. 15} referred at some length to Murchison, Trousseau, etc., showing that twenty-four hours seemed to be recognized as the shortest time of incubation, but he had 2 cases to show that the incubation could not be more than sixteen hours. The one was 4½ years, the other 2 years old. Both were admitted for tracheotomy demanded by diphtheria, and sixteen hours later the scarlet rash made its appearance. He further proves that the rash was in no way connected with the diphtheritic throat, and said that it was well known that wounds had a partiality for absorbing scarlet-fever virus. This proved, he thinks, that the incubation period may even be shorter than twenty-four hours.

According to Sørensen, ⁵⁷_{nos. 4, 7, 98} opinions differ widely in respect to the incubation period, and one must conclude that such a period can hardly vary within such wide limits. In 10 cases of this disease, occurring in patients who were operated upon by Paget, the period was one day in 2, two days in 3, and three days in 3. In 12 cases of puerperal scarlet fever the period was apparently three days in 9 of them. In 16 cases in which the disease followed tracheotomy the period was apparently three days in 12 of them. In all these cases, therefore, in which the infection was associated with a lesion of continuity, the period was very short, it being, in 2 of them, less than twenty-four hours. Apart from this form of infection, there are recorded cases in which the period of incubation was very short, varying from one to four days. Thomas considers that, as a rule, the period is from four to seven days. It would seem probable that

in cases in which infection is received through a wound the period is shortened. It is possible that, in a narrow sense, there is no true incubation period of the disease, but that there is only a longer or shorter period of time in which the virus is being disseminated. This hypothesis does not, however, furnish a very satisfactory explanation of the facts in the case.

Symptoms.—Russell Sturgis, ⁹⁹_{May 20, '98} reports a case of scarlatina coincident with varicella. He saw the child, aged 2 years, suffering with an attack of varicella of about forty-eight hours' duration. The first crop of vesicles was mostly broken and the second was perfect. The child was troubled with very profuse salivation, due to varicella vesicles in the mouth. A bright-red rash covered the chest and extremities; this appeared somewhat discrete on the inner aspects of the arms and legs; there was a general flush over the chest. There was reddening of the fauces and enlarged glands along part of the sterno-mastoid. The writer was uncertain as to whether the rash was an erythema, sometimes seen accompanying varicella, or not. On a second visit, a day later, it was quite evident that the child had scarlatina in addition to varicella, the characteristic symptoms of each disease being now well marked.

Wertheimber, ³⁴_{July 1, Oct. 1}, mentions a case of scarlatina occurring in a child 7 years of age, in whom, though the eruption was well marked and the tonsils and tongue presented their characteristic appearance, there was absolutely no pyrexia either morning or evening, the highest point reached being 99.6° F. (37.6° C.). The pulse, however, was rapid, being from 116 to 120 during the first three days. There was no albuminuria; desquamation began on the ninth day. Wertheimber also mentions a second case occurring in a child about the same age, where, though all the distinctive signs of scarlatina were present, the only time there was any abnormal temperature was the evening of the second day; then it was 100.6° F. (38.2° C.). Here, too, there was marked rapidity of pulse, and he suggests that this is probably an important sign in diagnosing the rare cases of apyrexial scarlatina. His opinion is confirmed by Beetz, ³⁴_{July 15}, who, immediately after the appearance of the article, reported 2 other apyrexial cases where the pulse was very rapid.

Charles H. Taylor, ⁶_{Aug. 3}, reports the following unique case of scarlet fever, measles, and diphtheria running together in the

same patient: E. W., aged 4½ years, was admitted into the Derbyshire General Infirmary, under Greaves, on March 29, 1890, suffering from scarlet fever. She had a typical rash, with sore throat and tongue. Temperature, 103.2° F. (39.6 C.). The fever ran an ordinary course, and on April 9th she was peeling generally, the throat being still somewhat swollen and the glands of the neck enlarged. On April 10th, twelve days after admission, the child began to sicken again and complained of headache; the temperature began to rise and there was marked coryza. On the 11th she had a rigor; temperature, 105.4° F. (40.8° C.); and the following morning presented a well-marked measly eruption over the face, neck, and wrists. April 13th, rash disappearing; temperature falling; child slightly better; throat still inflamed. 14th, temperature, 104° F. (40° C.); patches of membrane seen on both tonsils. 15th, membrane on soft palate, removal of which caused bleeding; much difficulty in deglutition and also in respiration; symptoms of laryngitis appearing. 17th, respiration still difficult; quantity of muco-purulent discharge from nose; throat less inflamed. 23d, child seems better; takes nourishment well; tongue cleaner; ulcers on tonsils, but no membrane to be seen; respiration much easier; pulse fairly good. 24th, has had two slight attacks of syncope while sitting up to be fed; seems unable to swallow in the recumbent position. 25th, the child, after awaking from a short sleep, was rather restless, had another fainting attack, and died. When the membrane first appeared on the tonsils, the physicians were doubtful as to its nature, and inclined to look upon it as merely an aphthous condition arising in the course of a specific fever; but from the way in which it spread to the larynx and nasal cavities, and the subsequent development of the general symptoms, they were induced to look upon it as a case of diphtheria, and to treat it accordingly. It is not uncommon for measles to supervene during an attack of scarlet fever, or for diphtheria to attack a patient suffering from measles or scarlet fever, but the occurrence of the three together is so rare as to be worth recording.

Our corresponding editor, Holger Mygind, of Copenhagen, states that Sørensen has found in the membranes of the scarlatina diphtheria a multitude of micrococci, which not only penetrated into the mucous membrane and the deeper parts of the throat, but were also found in more remote organs, as in the kidneys. Although

he has not succeeded in finding characteristic signs of these micrococci, he considers them the bearers of the scarlatinal virus, observing that when the mucous membrane of the sexual organs of the wife had been the gate of entrance for the virus, these micrococci were invariably found in the corresponding lymphatic glands. At a discussion in the Medical Society of Copenhagen, ⁵⁷³_{v. 4, p. 22} on this topic, Gram insisted on the necessity of examining fresh cases of scarlatina before the disappearance of the eruption. He had made such examinations, and had never succeeded in finding microbes in the mucous membrane of the throat, in the blood, or in the kidneys.

Complications.—S. J. Scott, ²²_{v. 1, p. 22} reports the following case: M. L., a girl aged 7 years, was taken ill with scarlet fever on November 4th of last year. It was a particularly mild case, the highest temperature being 100.8° F. (38.2° C.). The throat symptoms were very slight, and the rash faded naturally. The urine was normal in color and quantity until the 14th, when she passed 5 ounces of urine. Bladder almost empty. Hot poultices were ordered, with mustard over loins and hot fomentations over bladder. Nov. 15th: Passed 3 ounces of urine. Mixture containing digitalis and spts. ætheris nitrosi was given. Repeated mustard and linseed to loins. Nov. 16th: Passed one dessertspoonful of urine (early in the morning), thick, bad-smelling, and high-colored. Hot bath given, saline purgatives, and hypodermic of pilocarpine, $\frac{1}{4}$ grain (0.016 gramme). Profuse perspiration. Nov. 17th: No urine passed. Vapor baths (four), lasting for four, four, three, and two hours, respectively. Repeated pilocarpine, profuse perspiration. Nov. 18th: Cupping over kidneys. Vapor baths. Tongue very foul and breath has a very bad odor. Bowels freely moved by enema. Temperature, P.M., 97.5° F. (36.4° C.). Nov. 19th: Pupils dilated. Hypodermic of morphine, $\frac{1}{8}$ grain (0.008 gramme). Profuse perspiration. Vapor baths. Temperature, 99° F. (37.2° C.); pulse, 80. Muscular twitchings. Nov. 20th: Carter, of Liverpool, saw her in consultation. Considered the case practically hopeless, but suggested caffeine, 1 grain (0.065 gramme), dissolved with sodii salicylat., 3 grains (0.19 gramme), hypodermically. Vapor baths. Nov. 21st: Hypodermic of caffeine was repeated. Constant and uncontrollable vomiting. Pupils contracted. Convulsions; almost jumped out of bed once. Nov. 22d, 11 A.M.: Temperature, 96.3° F. (35.75° C.); pulse, 50; respiration, 12. Bladder empty.

N. B.—4 P.M.: Wanted to get up. Passed 20 ounces (622 grammes) urine, smoky and of a bad odor; almost solid when boiled. 8 P.M.: Passed 20 ounces (622 grammes) urine. Nov. 23d: Better. From this day progress has been uninterrupted. Tongue cleaned rapidly. Dec. 19th: Passed 40 ounces (1244 grammes) urine. Specific gravity, 1010. Albumen gradually diminishing. Appetite good. Desquamating freely all over body. Recovery attributed to free and constant action of skin, kept up by vapor baths and pilocarpine.

W. B. Grey¹, reported before the Richmond Academy of Medicine the cases of 2 children, aged respectively 2 and 4 years, affected with scarlatina, the older one of whom, just about the commencement of desquamation, developed the eruption of measles. In four or five days the younger did the same. Furthermore, about this time the father, an old man, took scarlet fever.

Duncan²⁰⁷ reported before the Atlanta Society of Medicine, February 5, 1889, a case of a child, female, aged 5 years. When seen by him, November 6th, had very frequent pulse; temperature, 104° F. (40° C.); general diffused eruption; exudation over pharynx, uvula, and nasal passages, completely blocking up the nostrils; larynx also involved; both eyes inflamed; diphtheritic exudation on side of left eye. November 10th, globe of left eye became affected; color grayish. Staphyloma supervened, and the eyeball ruptured; sight lost; child also complained of earache; was delirious, and her respiration difficult. After a few days the fever declined; membranes detached, both from throat and nose; no tendency to reform; child thought to be doing well. About fifteenth day a relapse occurred,—temperature, 102° F. (38.9° C.),—with recurrence of rash; the lids of the left eye took on inflammation, and were very much swollen. Abscess formed in lower lid, which was opened, and continued to discharge pus for some two weeks. Pus was discharged from both ears during third or fourth week. Desquamation began about third week; during second week albumen appeared in the urine, continued in quantity for a few days, then disappeared. The treatment adopted was of a tonic and stimulating character. Washes of bichloride and other antiseptics were frequently and thoroughly used. Duncan said he had great confidence in the iodine, iron, and potash treatment, and he believed the bichloride did great service in this case.

Bourges and Wurtz⁴⁵⁷_{v. 2, p. 361, May 17}² have carefully studied the pseudo-diphtheria of scarlet fever in the wards of the Trousseau Hospital. In consequence of the severe sore throats which occurred during the evolution of the fever, the little sufferers were removed from the fever ward to the diphtheria pavilion. A bacteriological examination of the false membranes revealed the presence of the streptococcus pyogenes, either pure or mixed with microbes incidental to suppuration, but in no instance did they succeed in detecting the presence of the Klebs-Löffler bacillus special to diphtheria. In 2 cases of pharyngitis, with false membranes occurring later on in the course of the fever, the bacillus of diphtheria was detected in the false membranes. One of the children with false membrane presenting streptococci, who was placed in the diphtheria pavilion, was seized with croup and died. Wurtz and Bourges conclude from their experiments that sore throat in the early stage of scarlet fever, however serious the symptoms may be, is not generally diphtherial; therefore, children with scarlet fever should not be placed with those suffering from diphtheria.

Alfred E. Vaughan²_{Sept. 27} was called, on the night of July 18th, to see a child, aged 5 years, who was suffering from excessive bleeding from the nose and mouth. On arriving at the house he found the child in a moribund condition. The history elicited from the parents showed that the little patient had been ailing for about two weeks, complaining of sore throat, and had had a slight rash. On examination, the writer found the surface of the body cold and clammy; the skin was distinctly desquamating; the cervical glands were much enlarged; radial pulse absent; heart-sounds very indistinct. An examination of a small quantity of urine showed it to contain about two-thirds albumen. The author was unable to examine the throat, as at intervals of about two minutes the child vomited large quantities of bright arterial blood. All attempts to arrest the hæmorrhage were futile, and child died from exhaustion in less than an hour. Vaughan believes the case was scarlatina, with deep and extensive ulceration of the tonsils, the ulceration finally leading to perforation of some of the large vessels of the neck, and causing death from hæmorrhage and exhaustion. Post-mortem was not granted.

Contagion of Scarlet Fever.—I. M. Rotch,⁵¹_{Feb. Mar.} in a lecture delivered at the Harvard Medical School, mentioned the following

case of contagion : A boy, 6 years old, and his sister, 4 years old, slept in the same room, with their beds close to each other. The boy was taken sick May 1st, but remained in the same room with his sister during the day and night of May 2d. He was seen by Rotch on May 3d, and was then found to have a well-marked scarlet fever. The sister was taken to the country and the boy left in charge of a trained nurse. There was then absolutely no communication between town and country house, by either people, clothes, or letter, until June 1st, when the lecturer was called out to see the sister, and found her with a well-marked scarlet fever. There were no other cases of scarlet fever in the vicinity of the country house. The boy at this time was desquamating freely, and the sister was found to have received from the boy, on May 20th, what she called a letter directed from the boy's scarlet-fever room by the nurse. The sister had kept this letter by her in her bed and under her pillow.

Prophylaxis.—Bäumler ⁸⁶⁶_{R.M.H.1.5} thinks that the urgent necessity for attention to the prophylaxis of scarlet fever is manifested by the universal experience as to the danger from the disease to life and health. It is also certain that the disposition to the disease is most decided within the period of the few years of early childhood, and that the longer a child remains exempt from it the less likely he is to have it. The bearers of the contagium of scarlet fever are the expired air of the patient, the secretions of the pharynx, epidermal scales, and the matter evacuated from the bladder and intestines. Since the time in which desquamation is fully accomplished must vary in different subjects, the isolation of patients should continue for a varying period of time. It should not terminate until desquamation from the hands and feet is entirely accomplished. This period may amount to forty days, or even much longer, and during that time patients must not come in contact with other members of the family, must not go to school, must not play with other children, and must not visit public resorts. Convalescents in public conveyances often transmit infectious diseases. The danger of infection from such patients is diminished if they receive frequent warm baths, inunctions of fatty substances, and especially careful applications of the latter to the hair and scalp. Convalescents who have been in hospitals should first be isolated in their homes before they are brought into contact with other members of their families.

Those who have acted as nurses to scarlatinal patients should not come in contact with the well, or with other diseased individuals, or, if this is impossible, they should be especially particular in regard to the septic condition of their hands and clothing. The hands should be washed in a solution of carbolic acid and the clothes be changed. They should also expose themselves freely to the open air. The sick-rooms should receive an abundance of pure air, the clothes of the patient should be washed in a 3-per-cent. solution of carbolic acid and then boiled in suds of potash soap, or disinfected with steam, and shoes should be washed inside and out with carbolic solutions. The sick-room and its utensils and furniture should be thoroughly disinfected and exposed to a free draught of air for several days. In the transportation of scarlatinal patients, all wagons or carriages should receive careful disinfection after transportation has been effected.

Treatment.—Vidal ¹¹³_{Oct.} recommends large doses of ammonium acetate in the treatment of scarlatina, and believes that it will also be found useful in the treatment of other exanthemata. In 3 children suffering from scarlatina, to whom he gave the drug in daily amounts of from 35 to 90 grains (2.27 to 5.83 grammes), the temperature rapidly fell and desquamation was established within four days. In the author's experience, the earlier in the course of the disease the ammonium acetate is given, the better are the results. Continuing the researches of Barkes, De Rosa ⁵⁸⁷_{v. 12, p. 91, Apr.} has administered to 66 children, belonging to families in which there was scarlet fever, a daily dose of 10 to 30 centigrammes ($1\frac{1}{2}$ to $4\frac{3}{4}$ grains), according to age, of salicylic acid. In 3 cases only did the disease develop. He concludes that salicylic acid absolutely prevents the development of scarlatina if it be taken in time and in a sufficient dose. Even when administered late, and in too small a dose, it renders the disease very mild. J. C. Wilson ⁹_{Dec. 14, '90} highly advocates the use of chloral in scarlet fever. The author pursues the following plan: So soon as the patient is suspected or known to be developing the disease, a laxative dose of calomel, proportionate to the age and general condition, is administered. Soon after, chloral is given, in moderate doses, at intervals of two or three hours, or longer, throughout the attack. The dose varies with the age of the child; the frequency of its administration depends largely upon the effect. To infants of 2 or 3

years, a dose of from 1 or 2 grains (0.065 to 0.13 gramme) may be given, the dosage being gradually increased with older children; that for adolescents reaching 5 grains (0.32 gramme). The tranquilizing and sleep-producing effects of the drug are, in most instances, promptly realized, the patient falling into a condition of quietude or somnolence, in striking contrast to the discomfort and jactation which are so distressing in the well-developed disease. The repetition of the dose should not be more frequent than is necessary to maintain this condition of quietude,—a condition from which the patient may be easily aroused, and into which he quickly relapses when disturbed. It is neither necessary nor desirable to push the drug to the establishment of a deeper sleep. Profound narcotism is, of course, to be avoided. The patient may thus be kept in a condition of light repose throughout the whole duration of the fever. By this means, not only is there obtained relief from the restlessness and distress of the active period of the disease, but much wear and tear of the nervous system, and some exhaustion from muscular effort are prevented. Delirium is controlled; the itching and burning of the skin, due to the eruption, are allayed; in a word, the greater number of the distressing symptoms of the disease are favorably influenced by the cautious and prolonged administration of the drug in efficient doses. The author finds the following formula to mask the acrid after-taste of chloral:—

R Chloralia, gr. xxx (1.94 grammes).
 Syr. lactucarii (Aubergier),
 Aquæ, aa fʒiss (46.65 grammes).—M.

Sig.: A teaspoonful in iced water every two, three, or four hours. The administration of nourishment immediately after the medicine is desirable.

The writer bases his theory on the following propositions: 1. The treatment of scarlet fever by chloral hydrate without the use of other drugs has yielded satisfactory results. 2. The chief rôle of chloral in the treatment of scarlet fever is that of a sedative to the cerebral centres. It appears to antagonise certain exciting toxic principles formed within the organism during the course of the disease. 3. Chloral is also useful on account of its antiseptic properties: (a) upon the throat; (b) upon the kidneys; (c) to a slight extent upon the fluids of the organism at large. It is necessary, in this connection, to bear in mind the difference between the germicide and the antiseptic influence of drugs. No amount

of chloral compatible with the maintenance of life can act within the organism as a germicide. It is assumed that medicinal doses may tend to render the fluids of the body antiseptic; that is to say, may *tend* to impair, to some extent, their fitness as culture media for pathogenic bacteria. 4. The elimination of chloral by the kidneys and its diuretic effect render it especially useful in the treatment of scarlet fever.

Louis Starr⁵¹ states that the most important point in the treatment of scarlatinal anasarca is to guard against the attack altogether. For this reason a scarlatinous patient should be kept in bed until the end of the sixth week, and even then the prognosis is to be guarded, as there may be an insidious disease to be developed within a year. To put the matter in a nutshell, keep the child in bed, sufficiently covered, for at least six weeks, the temperature of the room being from 64° to 68° F. (17.8° to 20° C.), and let the diet be liquid and chiefly of milk. It is well to continue some form of iron all through this period, preferably the tincture of the chloride or Basham's mixture. Digestion is to be aided by pepsin, if necessary, and the bowels must be kept open by glycerin suppositories or simple enemata. During the stage of desquamation, daily anoint the entire surface, including the scalp, with an ointment of—

R Acid. carbolic, gr. xx (1.3 grammes).
 Thymoli, gr. x (0.65 gramme).
 Vaselini vel ung. simp., ℥j (31.1 grammes).—M.

Then put in a warm bath for five minutes, protecting from cold, and put to bed, wiping the body dry beneath the bedclothes. This has the effect of hastening desquamation, and of disinfecting and preventing the dispersion of the scales, which are active vehicles of the contagium.

The diet should be light, consisting of milk, broths, and a limited quantity of bread. The patient must not be taken out of doors until the œdema and albuminuria have disappeared. Then in clear and dry weather he should have exercise in the open air, short of fatigue. A warm bath, of temperature between 95° and 100° F. (35° and 37.8° C.), is to be given twice a week, preferably just before going to bed. A fluidrachm (3.89 grammes) of Basham's mixture should be administered thrice daily, and the bowels kept regular; for this purpose 2 drachms (7.78 grammes)

of milk of magnesia may be given in the morning as required. In nephritis of acute type it is necessary to use more active means: confinement to bed, milk diet, poultices to the loins, and, if suppression of urine has occurred, four dry cups over the renal region, with a saline purge, and some remedy to act on the skin. To accomplish the latter indication, steam baths and jaborandi combined with citrate of potash are most efficient, as follows:—

R Ext. jaborandi fluidi, f ʒss (15.55 grammes).
 Liq. potassii citratis, . . . q. s. ad f ʒiij (93.8 grammes).—M.
 Sig.: Teaspoonful every four hours, at the age of 6 years.

Digitalis, in appropriate doses, may be added if the heart is weak or irregular. If convulsions occur, bromide of potassium and chloral must be used. For a child of 6 years, 15 grains (0.97 gramme) of bromide and 2 grains (0.13 gramme) of chloral, suspended in mucilage, may be given by the rectum. Diuretics are recommended by some practitioners, but they have always seemed to Starr to add to the work of the already overburdened kidneys, and to do more harm than good.

Disinfection in Scarlatina.—I. M. Rotch⁵¹ says that sulphur fumigation is entirely unreliable, and that it should be looked upon as a relic of past ignorance, notwithstanding that its use is still recommended, and, in fact, enforced by certain boards of health. If there be paper on the walls, it had much better be thoroughly scraped off and immediately burned. The floor is then to be thoroughly wet with carbolic acid, 5 per cent., and then the ceilings, walls, all the wood-work, and furniture are to be thoroughly rubbed with bread, which Esmarch has shown to be the best method for removing infectious material from surfaces of this kind. The micro-organisms adhere with great tenacity to the bread, which, with any crumbs which break off and fall to the floor, must be carefully collected and destroyed by fire. The room should then be thoroughly aired for several days; and, if practicable, it is well to have the whole room, including the ceiling, walls, and floor, painted. The physician must bear in mind that his hair, beard, clothes, etc., are the possible means of transmitting the contagium from one patient to another, and it is his manifest duty toward the public to change his clothing and disinfect himself on leaving a scarlet-fever patient.

MEASLES.

Incubation.—James A. Myrtle,² reports a case of measles occurring in a young ladies' boarding-school, with thirty-five resident scholars; the girl was at once removed to a cottage in the rear of the dwelling-house, complete isolation secured, a nurse put in charge, and all communication cut off. In twelve days the patient and nurse were sent away and the cottage and everything in it thoroughly disinfected. Exactly fourteen days after this girl showed the disease a second case occurred, fourteen days after that a third, fourteen days after that a fourth, and fourteen days after that a fifth. Nos. 1, 2, 3, and 5 belonged to different classes and slept in different rooms; Nos. 1 and 4 were sisters and slept together; but No. 4 showed the disease eight weeks after her sister. Each case, as soon as it declared itself, was removed to the hospital. The outbreak in the first instance was supposed to have been caused by infection when away from school, but that is by no means certain, as measles was prevalent in the district. Comment on these clinical records is needless.

Complications.—At a recent meeting of the Royal Society of Physicians of Buda-Pesth, S. Róna,² related a case of inflammation of Cowper's glands during measles. Such a complication has not hitherto been recorded in connection with an acute exanthem. The patient, aged 16, who was admitted into the hospital with severe measles, became aware, on the second day after his admission, of a swelling in the perineal region, which in three days assumed the size of a hazel-nut. Examination by the rectum revealed the presence of a swelling of the right Cowper's gland. The application of ice and an ointment of iodide of potassium effected a cure.

Charles Bauer¹¹² was called to see J. M., aged 9 months, healthy at birth; continued in good health up to January 28th, when the characteristic eruption of measles was observed on the face, and, to some extent, on the chest. There was no fever; slight coryza and a slight cough. Bowels were slightly relaxed. The child was again seen January 30th, when the eruption had pretty well spread over the body. Constitutional disturbance was absent. February 3d the mother sent word that the patient was well.

Was called February 6th. The child had been restless, feverish, and irritable during the previous day; she had three motions

from the bowels, the last one having a green color and being voided with evident pain. During that night she had fever and frequent attacks of colic. On inquiry, the author was told that the eruption had disappeared, leaving some purplish spots. These were no longer visible the following morning (fifth day of eruption), and, with the exception of slightly-loose bowels, the child seemed well. Examination February 6th failed to reveal anything of importance. During that day and the following night and morning the attacks of intestinal pain became very severe, and frequent, incessant vomiting set in, and about noon (February 12) the child had a profuse intestinal hæmorrhage, losing between $2\frac{1}{2}$ and $3\frac{1}{2}$ ounces of blood. During the afternoon and evening three slighter hæmorrhages occurred. The attacks of intestinal pain and vomiting continued until February 19th, when these symptoms abated in severity. On February 20th the vomiting ceased, abdominal pain subsided, and toward evening the child voided a perfectly normal stool, and is now rapidly recovering.

Dieulafoy,⁸¹ reports the following case: Girl, aged 12. A slight eruption was noticed on the face, which gradually spread over the rest of the body on May 10th, but, as there was no fever and no malaise, no anxiety was felt. The next day the diagnosis of an erythema resembling measles was made, and the case was regarded as trivial; and, in fact, for the three following days there was no fever, and the child was apparently doing well. On May 18th cough appeared; on the 19th the voice became hoarse, and some disseminated sibilant râles were heard; the throat was red, and from the 20th to the 22d of May the oculo-nasal catarrh increased. Finally, on May 23d, a distinct eruption of measles appeared, with vomiting and a temperature of 104° F. (40° C.) at noon. The agitation was well marked, respiration hurried, and but little rest was obtained. On the following day the writer was called in consultation, and found an abundant eruption of measles, with excessive agitation and almost entire suppression of urine. On account of the rapid occurrence of these symptoms, a diagnosis of malignant measles was made, and, since the gravity of the condition could not be attributed to any local complications, cold baths were proposed.

The first was given about noon, the patient having a temperature of nearly 104° F. (40° C.), with pulse of 145. The temperature

of bath was 78.8° F. (26° C.), being cooled gradually to 77° and 70° F. (25° and 21.1° C.), cold water being first applied to the head. The patient was withdrawn in about twelve minutes, without any apparent change in condition. Two other baths were given—one at 2 o'clock and the other at 9 o'clock—in the same evening, without producing any decided results. At the last the temperature was at 104° F. (40° C.), and numerous râles, occurring in the right lung, led to the fear of a pulmonary complication and considerable hesitation as to the pursuing of this plan of treatment. However, at 2 o'clock in the morning a fourth bath was given, which reduced the temperature to 103° F. (39.5° C.). The child urinated, the skin became softer, and the pulse fell to 125; while, after the fifth bath, temperature fell to 102° F. (38.9° C.), and the sleep was calm. These baths did not have any effect on the eruption. The next morning at 8 o'clock the child was still asleep and the râles had disappeared. Two other baths were given May 26, the temperature falling to 102° F. (38.9° C.), and progressively declining until the patient was completely cured. Thus, here we have a case of measles, rapidly assuming the malignant form, which was apparently cured by cold baths, but the improvement did not appear until after the fourth bath. One of the most striking facts in this case is that, as a consequence of the cold baths, the suppressed function of the kidneys was resumed, and, as it is well known that suppression of urine is one of the dangers most to be dreaded in virulent diseases, the production of diuresis by cold baths is certainly a very strong argument in their favor.

Again, it would appear that the case reported showed signs of approaching bronchitis, and yet, on the very next day after the application of the bath, the râles had almost entirely disappeared. Of course, it is not certain that the cold baths relieved the pulmonary function, but it is certainly well known that in typhoid fever pulmonary complications are no obstacle to the administration of cold baths, and even in infectious forms of pneumonia they are employed with benefit. The baths were administered even while the skin was covered with a profuse eruption. After each bath it was noticed, however, to regain its intensity in the lapse of a quarter of an hour, the eruption or desquamation not being influenced by the bath. The writer, therefore, claims that in the ataxo-

adynamic forms of disease, no matter when they may occur, benefit may be expected from cold baths without fear of any complications, provided they be given regularly and with perseverance.

Treatment.—Juhel-Renoy and Duponchel¹⁶⁴_{May 15} testified to the use of the cold bath in such cases with truly marvelous results.

Waugh⁷⁶⁰_{May 17} has had, in his practice, a singular experience with phenacetine. A little girl, 4 years old, had measles, and with it a severe attack of catarrhal pneumonia. Through this she slowly struggled, when, upon Saturday, May 10th, her youngest sister was presented to the author with the symptoms of commencing measles typically displayed. Phenacetine was ordered, in doses of 2 grains (0.13 gramme), with $\frac{1}{2}$ grain (0.032 gramme) of Dover's powder, to be given every two hours. The next day all signs of the disease had vanished, the temperature had dropped to normal, and the child ate and played as usual. During the following day she became feverish, and began to sneeze and cough again; but, after a few of the powders, these symptoms passed away. Another sister, aged 6 years, also commenced to show the same evidences of morbillous infection; but these quickly passed off under the same treatment. Neither had ever been attacked previously by measles. The writer does not affirm that the phenacetine actually aborted the attack, but the inference that such was the case is strong enough to warrant a more extended trial.

RÖTHELN.

Alex. S. Stone and Wm. Davis¹⁰⁵_{May 15} write an editorial on the above subject, and state the following: In an epidemic that occurred last spring, in an orphan asylum in St. Paul, rötheln appeared first among the inmates and spread through the institution, but was hardly well under way before genuine measles was introduced. An opportunity was thus obtained of seeing the two diseases running side by side, with an abundance of material to feed upon, there being some forty children in the asylum, few of whom were protected by a previous attack of either disease. So far as the eruption went, the similarity in appearance was very striking in many cases. Where the eruption of rötheln was fully developed, its resemblance to the efflorescence of measles was so close that, even when patients were placed side by side, the difference was but slight, both in the color and shape of

the rash. But after the first case of measles was once detected, the differential diagnosis was easy. The eruption of rötheln broke out all over the body at once; the catarrhal symptoms were slight even when the rash was intense; the post-auricular glands were almost always enlarged and tender; but most striking of all was the fact that the rötheln patients suffered so little indisposition, neither their activity nor their appetite diminishing to any extent, when covered with an eruption as intense and universal as in the severest measles. The conclusive proof that there were two distinct diseases in the house lay in the fact that fully a dozen of the children (unfortunately, no accurate figures were kept) had first one disease and then the other, not in a way that could be accounted for by relapses, but often with a clear interval of a fortnight of sound health. Some had measles first and then rötheln; others rötheln first and then measles; but, whether it came first or second, the children were always decidedly sick with the measles, and never more than indisposed with the rötheln.

If rötheln be not a distinct disease,—if, as the writers quoted above hint, it be true that what is called rötheln is really a mild and irregular form of measles,—then measles behaves in a strikingly different way from its congeners,—scarlet fever and small-pox. No one questions that varioloid is a mild form of small-pox, or that there is a very mild form of scarlet fever, such as that which prevails in St. Paul to-day. The evidence of the existence of mild small-pox and scarlet fever is not only to be found in the eruption and its accompanying symptoms, but in the *sequelæ* and the immunity from subsequent attacks, conferred by even the mildest scarlatina or varioloid. It is not uncommon for acute Bright's disease to follow an attack of scarlet fever so slight that the subject of it has played out of doors uninterruptedly the whole time; how often is it recorded that broncho-pneumonia follows rötheln? Second attacks of small-pox or scarlet fever are rarities, no matter how light the first attack. On the other hand, it is frequently alleged that the victim of measles has already had the disease.

This question of the separate existence of the disease rötheln is not of trifling importance. Measles is a disease whose mortality is, in the long run, little less than that of scarlet fever,—nay, it is often even greater. If rötheln be mistaken for measles, children

who have had the former disease may be exposed to measles under the belief that they are protected. The writers do not pretend to settle the matter, but it is hoped that, by drawing attention to the subject from the point of view taken, new light may be thrown upon it.

Incubation.—A. W. Flood,²_{Mass.} in view of the uncertainty of the incubation period of German measles, according to most authorities ranging from ten to twenty-one days, gives his experience, having attended a number of cases of German measles during the last few months. In 3 of these cases he states positively that the rash appeared on the fifteenth day after exposure to infection, there being only a single exposure in each of the 3 cases. The invasion stage in all the cases was very short,—only a few hours,—the patient going to bed apparently all right, to find next morning his face and neck covered with distinctive rash. The only visible symptom before appearance of rash was enlargement of lymphatic glands of neck, which appeared a couple of days previous to it. In only one of the cases did the temperature rise to 102° F. (38.9° C.); in all the others it remained under 100° F. (37.8° C.). The rash could be distinctly seen on the mucous membrane of palate and fauces, causing a sensation of roughness and soreness in the mouth and throat. The fever and rash had disappeared by the third day, leaving patient much debilitated. A week in the house completed the cure.

H. H. Spires²²²_{Ind.} reports an epidemic of rōtheln occurring in the spring of 1888, in Edinburgh, Ohio. It included over 40 cases; was traced by contagion to three adjoining townships, and embraced all ages, from the infant in arms to the heads of families; 3 cases past 40 years of age and 1 of 57 years. No other acute disease prevailed at the time. It seemed to attack indifferently those who already had scarlet fever and measles. From closely observing this epidemic, the author bases his facts on the following: 1. Rōtheln usually appears in epidemics. 2. Rōtheln is a specific disease, distinct from scarlet fever and measles. 3. After the first outbreak, rōtheln is generally conveyed by contagion, but in some cases may be conveyed by fomites. 4. Rōtheln has an incubative period of from nine to fourteen days. 5. Rōtheln is not “pre-eminently a disease of childhood,” but may appear at any period of life.

DIPHTHERIA, CROUP, PERTUSSIS, AND PAROTITIS.

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DIPHTHERIA.

CONSIDERABLE progress has been made during the past year in the elucidation of diphtheria. It has been demonstrated by many observations that the disease heretofore designated by the term diphtheria embraces two diseases, which may be conveniently designated diphtheria and pseudo-diphtheria. If we do not approve of this nomenclature, and prefer to designate by the term diphtheria all pseudo-membranous inflammations having a microbic origin, it is necessary to recognize at least two varieties of diphtheria, the first originating from the action of the Klebs-Loeffler bacillus, and the second produced by the action of microbes different from the Klebs-Loeffler bacillus, and having, in some respects, different symptoms and a different pathology from those of the disease caused by that bacillus.

The Klebs-Loeffler bacillus alighting upon the faucial or other mucous surface, or the skin denuded of its epidermis, obtains there a nidus favorable for its development and propagation, but it does not enter the interior of the system. It is not taken up by the lymph-ducts, or blood-vessels, and conveyed to the internal organs. It remains localized upon the surface, and produces there the characteristic inflammation. Acting solely upon superficial parts, it cannot in itself produce systemic infection, or blood-poisoning, but, as the venomous reptile or the bee secretes a poison which it communicates by its fang or sting, it produces a poison, called a ptomaine, which is readily taken up by the lymphatics and blood-vessels and conveyed to every part of the system, and this ptomaine produces the systemic infection or poisoning from which so many of the victims of diphtheria perish.

L. Brieger and Karl Fraenkel⁴_{Nov. 17} say of this ptomaine that it is destroyed by a heat above 140° F. (60° C.). It may be evaporated at 122° F. (50° C.). It is soluble in water, but insoluble in alcohol. It is not precipitated by ebullition, nor by the following medicinal agents: sulphate of sodium, nitric acid, and acetate of lead. On the other hand, it is precipitated by concentrated carboic acid, the ferrocyanide of potassium, acetic acid, carboic acid, and nitrate of silver. It has the following composition:—

Carbon,	.	.	.	.	.	.	.	.	.	45.35
Hydrogen,	.	.	.	.	.	.	.	.	.	7.18
Azote,	.	.	.	.	.	.	.	.	.	16.33
Sulphur,	.	.	.	.	.	.	.	.	.	1.39
Oxygen,	.	.	.	.	.	.	.	.	.	29.80

Introduced into the circulation of rabbits and guinea-pigs, it caused death in the small quantity of 2½ milligrammes to each kilogramme in the weight of the animal. Sometimes death did not occur until after weeks or months. The ptomaine did not produce a pseudo-membrane in the animals experimented on. Preserved in a vacuum, it retained its virulence for weeks or even months. It seems to be allied by its composition to the proteids or albuminoids. It bears a certain resemblance to ichthyotoxicon, obtained from sea-eels. In attenuated cultures Brieger and Fraenkel were able to produce a non-toxic albuminoid having the following composition:—

Carbon,	.	.	.	.	.	.	.	.	.	49.00
Hydrogen,	.	.	.	.	.	.	.	.	.	7.00
Azote,	.	.	.	.	.	.	.	.	.	15.00
Sulphur,	.	.	.	.	.	.	.	.	.	2.23
Oxygen,	.	.	.	.	.	.	.	.	.	26.97

Roux and Yersin,⁴⁸_{Sept., '90} in their second communication to the medical journals, state that their recent investigations have strengthened the belief that the bacillus itself is comparatively innocuous, and that the poisonous effects of diphtheria are due chiefly to the ptomaine produced by the bacillus. The ptomaine inoculated in dogs and sheep caused paralysis similar to that resulting from diphtheria in people. If the filter liquid, containing only the ptomaine, was injected under the skin of rabbits and guinea-pigs, the result was very fatal; but introduced into the stomach it caused little inconvenience. The toxicity of the cultures was diminished by the addition of carboic acid, boric acid, or of borax.

During the epidemic in the village of Horn in the Nether-

lands,^{5 Apr.} results of experiments were obtained very similar to those reported by Loeffler, Roux, and Yersin. Cultures of the Klebs-Loeffler bacillus inoculated in rabbits and guinea-pigs caused the characteristic diphtheritic pellicle, and the bacilli, abundant in the pseudo-membrane, were not found in the lymphatic glands, blood, or viscera. In addition to the paralysis, nephritis, with albuminuria, was produced in rabbits by inoculation with the ptomaine obtained by filtering cultures.

E. Klein, of London,^{282 July} has examined the faucial secretion and pseudo-membrane in 22 cases of diphtheria, and in every case found the Klebs-Loeffler bacillus. In 12 cases he found also a bacillus closely resembling that of Klebs-Loeffler in form and growth, but not pathogenic.

V. Bates, of Bucharest,^{20 xlv} also states that he found the Klebs-Loeffler bacillus in all the cases which he examined, and he produced typical diphtheritic inflammation in rabbits by inoculating with cultures of the bacillus. He also obtained a clear fluid free from micro-organisms by passing cultures of the bacillus through a Pasteur-Chamberland porcelain filter, but it contained a toxine. Subcutaneous injections of 30 cubic centimetres (1 ounce) of this fluid in rabbits were fatal in twenty-four to forty-eight hours, from paralysis of the respiratory muscles and heart. If only 5 to 10 cubic centimetres (1½ to 3 drachms) were injected, the animals lived several weeks, but, as a rule, finally died with paralysis of the posterior extremities, followed by that of the respiratory muscles and heart. Inoculations with the cocci occurring along with Loeffler's bacillus did not produce a pseudo-membranous inflammation. In animals inoculated with this bacillus this organism was found after death only in the immediate vicinity of the inoculation.

The Klebs-Loeffler bacillus is described as follows by Jules Simon^{14 June 11}: It is a small linear microbe, about the same length as the tubercle bacillus, but ordinarily more than double its thickness. It often presents a granular appearance, and is stained in two minutes by the violet of methyl. This bacillus presents different aspects, which to the experienced eye are characteristic. It often presents a more intense coloration of its extremities than of its central parts, and the extremities are sometimes swollen, or only one is swollen, so that it presents the appearance of a pear or gourd. Occasionally it is curved like an arc.

Armand Ruffer,²_{July 22} has also made carefully conducted microscopic examinations of the diphtheritic pseudo-membrane, employing staining processes. His observations enable him to state that the Klebs-Loeffler bacillus occurs most abundantly in the superficial portions of the pseudo-membrane,—that an active struggle takes place between the amœboid cells of the mucous surface and the pathogenic microbes of diphtheria; and the reason why the bacilli do not actually penetrate into the tissues is probably that as soon as they try to do so they are arrested by the amœboid cells present in the diphtheritic membrane. This view of an active struggle between the Klebs-Loeffler bacillus, aided by the staphylococcus and streptococcus on the one side, and the conservative cells on the other, seems fanciful; but if we accept this idea of a conflict, certainly the Klebs-Loeffler bacillus overcomes the antagonistic cells in a large proportion of cases by the poison which it transmits.

Clinical observations and experiments similar to those related above have been made by many others, so that the theory that the Klebs-Loeffler bacillus is the cause of true or typical diphtheria is as well established as most of the accepted theories relating to the origin of the infectious diseases. A pseudo-membranous inflammation upon the mucous or cutaneous surface is, as we will see, sometimes produced by other microbes than the Klebs-Loeffler bacillus; but this bacillus causes a disease which has distinguishing characters, especially the production of a peculiar toxine, which brings about certain definite anatomical changes in the interior of the body,—a peculiar paralysis and a nephritis, attended by an albuminuria which does not cause dropsy or uræmic poisoning. These characters distinguish true diphtheria—the diphtheria caused by the Klebs-Loeffler bacillus—from other pseudo-membranous inflammations of microbic origin.

In this connection it may be well to state that in some cases of diphtheria a bacillus bearing some resemblance to that of Loeffler has been found along with this microbe. Whether it be a degenerate form of the bacillus of Loeffler, or another species, bacteriologists state that it can be differentiated from it by chemical tests, and it does not possess its virulence. According to E. Klein, of London,¹⁴⁷_{July} this bacillus is only occasionally present in the diphtheritic pseudo-membrane, and it does not act pathogenically on animals. Other experimenters have also remarked that it is not

pathogenic, or only slightly so. There can be little doubt that it has sometimes been mistaken for the Klebs-Loeffler bacillus.

As has been stated, the fact has been demonstrated by numerous inoculations in various countries that the Klebs-Loeffler bacillus does not enter the system, but remains localized at the seat of the inoculation; but Klein states that his inoculations of the cow show that in this animal the bacillus is sometimes taken up by the blood-vessels or lymphatics and conveyed to the interior of the body, so that systemic infection occurs from the presence of the bacillus itself in every part of the system. The following were Klein's experiments¹⁴⁷_{July}: Two cows were inoculated in their left shoulders. Both animals subsequently had slight elevation of temperature and a cough, and were very ill. In both, on the fifth day after the inoculation, red papules appeared on the udders and teats. Within five to seven days these changed into vesicles, pustules, and crusts, with sores underneath. The eruptions on the udder on the fifth day contained the bacillus, as did also the milk obtained from one of the animals. Both cows had congestion of the lungs and pneumonic lobules. Inasmuch as the theory that the specific bacillus does not enter the interior of the body, but remains localized on the surface, where it has obtained a lodgment, has been apparently established by clinical observations in animal inoculations, the opinion has been expressed by as high an authority in bacteriology as Klein himself that there was probably some error in his observations.

Pseudo-Diphtheria.—We have said that clinical observations and experiments have demonstrated the fact that other microbes besides the Klebs-Loeffler bacillus sometimes produce a pseudo-membranous inflammation. To this inflammation we prefer to apply the term pseudo-diphtheria. Salomon states that not only certain other microbes, but irritating medicinal agents, as cantharides, chlorine, and ammonia, have the power to excite an inflammation, with fibrinous exudation, which cannot be distinguished by its appearance and anatomical characters from that of true diphtheria except by the absence of the cause of the latter disease, viz., the Loeffler bacillus. The inflammation produced by non-microbic irritating agents, as boiling-water, steam, cantharides, chlorine, and ammonia, though attended by an exudation of fibrin, is distinct in nature from that caused by microbic agency.

The most common form of pseudo-diphtheria appears to occur during the course of the eruptive fevers, especially scarlet fever and measles. M. Sevestre, of Paris, says that the pseudo-membranous sore throat, which occurs in the course of scarlatina, is generally considered in France as having a diphtheritic origin, and the patients who are suffering from it are placed in the diphtheritic wards. It is, however, a variety of sore throat which should be distinguished from the diphtheritic. It is an early manifestation, and develops in the first days of scarlatina. It is characterized by the production of white patches, which frequently are exactly similar to those of diphtheria, and which respect neither the uvula nor the soft palate; so that the diagnosis is often very difficult. But the pseudo-membrane does not extend to the larynx, and the general condition of the patients remains in most cases satisfactory. These sore throats, says Sevestre, commonly end in recovery, and they do not communicate diphtheria to neighboring children.

MM. Wurtz and Bourges⁴⁵⁷_{May} made microscopic examination in 9 cases of supposed diphtheria complicating scarlet fever. In 2 of the cases in which diphtheria occurred at a late period, the Klebs-Loeffler bacillus was found, but in the other cases, in which the pseudo-membrane occurred early, this bacillus was not found, but streptococci were present. In 6 of the cases the pyogenic staphylococcus also was observed. The fact that the Klebs-Loeffler bacillus did not occur in cases in which a membrane appeared at an early stage of scarlet fever, say the writers, furnishes ground for the belief that the appearance upon the faucial surface, which was supposed to indicate the presence of diphtheria, was due to the intensity of the scarlatinous inflammation; while in 2 cases in which the pseudo-membrane appeared at an advanced stage (the sixth and ninth days), when the scarlet fever was beginning to decline, in both of which cases the Klebs-Loeffler bacillus was present, true diphtheria had supervened.

MM. Wurtz and Bourges also state that they have previously called attention⁷⁶⁰_{May 27} to the fact that there is no difference between the pseudo-membranous angina of scarlet fever and true diphtheria, except that the bacillus of Loeffler is absent from the former, but the effects of remedies are different in the two. True diphtheria, they say, is most favorably influenced by chlorine solutions, which are by no means as useful in the scarlatinal inflammation, while in the

latter salicylic acid exhibits a curative power which is not manifested in diphtheria. They, therefore, believe that the pseudo-membranous angina of scarlet fever and that of diphtheria are ordinarily distinct diseases, but in two instances patients with the scarlatinal angina, who were removed to the diphtheritic pavilion, were soon after attacked by genuine diphtheria. Hensch, of Berlin, ³⁴ Oct. 22, '90 mentions the difficulty at the bedside in some instances of discriminating scarlatinous necrosis from a pseudo-membranous inflammation, and sometimes the pseudo-membranous angina that occurs in scarlet fever is really diphtheritic, but when diphtheria supervenes the scarlet fever is well under way or in its declining stages; only in such cases of pseudo-membranous inflammation in scarlet fever does diphtheritic paralysis occur.

At a meeting of the Royal Academy of Medicine in Ireland, McWheeney ² Aug. 23 related the case of a child that died of pseudo-diphtheria occurring in the declining stage or immediately after scarlet fever. The mucous membrane of the upper part of the larynx was found coated with a thin layer of greenish-gray pseudo-membrane. Sections showed numerous micro-organisms in masses and scattered through the membranous exudations. Some of these were cocci and others bacilli. The cocci were scattered or in pairs, and the bacilli were smaller than the Klebs-Loeffler, and were certainly not of the same species, as ascertained by staining. The absence of the Klebs-Loeffler bacillus showed that the child died of pseudo-diphtheria instead of true diphtheria. T. M. Prudden, ⁵ May, '90 relates the microscopic examinations of the pseudo-membrane, underlying tissues, and viscera, removed from the bodies of 24 children who were supposed to have perished from diphtheria. But these cases, with two exceptions, were treated in institutions where epidemics of the other infectious diseases occasionally occurred, and 16 of them had scarlet fever, measles, whooping-cough, or an erysipelatous or phlegmonous inflammation in parts at a distance from the fauces at the time of death. In no one of these specimens sent to Dr. Prudden by curators or reputable physicians, as specimens removed from the bodies of those who had died from true diphtheria, could he find the Klebs-Loeffler bacillus, but instead he discovered the streptococcus and staphylococcus. These cases for a time misled Dr. Prudden and the entire medical profession in this country, for the absence of the Klebs-

Loeffler bacillus in the specimens of 24 consecutive cases seemed to show that this bacillus could not be the cause of diphtheria. But in no one of these cases, so far as their histories show, did paralysis, which is so characteristic of true diphtheria, occur, and, if I am correctly informed, Dr. Prudden now believes that the disease in all these 24 cases was pseudo-diphtheria. He has since made examinations in 10 or 12 cases of true diphtheria, and found the Klebs-Loeffler bacillus in all. Professor Welch, of Johns Hopkins University, cautious and conservative in his statements, has also cultivated the Klebs-Loeffler bacillus, and, by inoculating animals with the cultures, has produced diphtheria. Therefore, he, like other distinguished bacteriologists, believes that the theory that this organism causes diphtheria is fully established.

From the facts as stated above, we repeat that the disease heretofore designated diphtheria we must now regard as two diseases, to wit, diphtheria, resulting from the action of the Klebs-Loeffler bacillus, and pseudo-diphtheria, resulting from the agency of other microbes; or else we must recognize two varieties of diphtheria—the one being produced by the Klebs-Loeffler bacillus, and the other by other organisms.

Animal Diphtheria—Diphtheria Propagated from Animals to Man.—Various health officers have reported the occasional occurrence of an acute disease of the lungs in cats in connection with human diphtheria. In the north of London, in the spring of 1889, a wide-spread acute catarrhal affection of the respiratory passages occurred among cats, and along with this mysterious disease diphtheria prevailed among the children. Klein⁴⁷ made post-mortem examinations of two cats that had had the epidemic broncho-pneumonia, and one of them had paralysis of the hind limbs. In both there were the additional lesions of large white kidneys “due to fatty degeneration of the entire cortex.” In Shrewsbury, in a house in which diphtheria was prevailing among children, two cats died of pneumonia, and one of them was sent to Klein. On dissection, large white kidneys were found in addition to the broncho-pneumonia. Inoculations of cats were made with particles of fresh diphtheritic membranes, and of others with cultures of the diphtheritic bacillus. At the seat of the inoculation a local diphtheritic tumor was produced, and if death occurred after one or more weeks broncho-pneumonia and large white kid-

neys were found. The diphtheritic bacillus was recovered by cultivation from the tumor at the point of inoculation, but in no instance was it discovered in the interior of the body. Therefore, Klein infers that in the cats experimented on the visceral disease is due, as in guinea-pigs and in man, not to the action of bacilli in the viscera, but to a ptomaine produced by the bacilli at the point of inoculation and absorbed. Cultures of the bacillus were introduced into the uninjured tracheas of cats, and on the post-mortem examination of them, two to seven days subsequently, pneumonia and fatty degeneration of the kidneys producing the white hue were present. In the muco-pus, the air-passages, the bacilli were present in large numbers, and the exudation of the bronchi and air-cells bore a striking resemblance to the diphtheritic pseudo-membrane.

Lawrence, ²²_{June}, reports 2 cases under his care in which diphtheria seems to have been communicated by cats. In the first case, that of a little girl, a careful inquiry showed that the child had not been exposed to any case, although diphtheria was prevailing within a mile of the patient's residence, but she had fondled a sick cat a few days before. The cat died some days after, and a second cat became sick and was killed. Inquiry disclosed the fact that a neighboring farmer had lost seventeen cats and another fifteen cats from a throat disease, and one of the farmers stated that he had examined the throats of some of the cats and found them covered with a white membrane. Cats run from house to house, and, as they are petted by children, it appears from recent observations that they are the medium by which diphtheria is communicated in some of the instances in which its origin is obscure.

Bruce Low, ²_{May 10}, in his report to the Local Government Board, states that a little boy at Enfield had fatal diphtheria, and vomited on the first day of his illness. A cat licked the vomited matter from the floor, and soon after the boy's death it was noticed to be ill, and its suffering and symptoms so closely resembled those of the dead boy that it was destroyed by the owner. During the first part of its sickness the cat was allowed to go out in the back yard, and a few days subsequently the cat of a near neighbor was observed to be ill. This cat had also frequented the back yard. The second cat was nursed during its sickness by three little girls, all of whom took diphtheria.

S. C. Coleman, of Colorado, Texas,⁵⁹ states that after a residence of five years at Colorado he saw the first case of diphtheria. A child of 5 years, living 30 miles distant in the country and no neighbor within 6 miles, had this disease, followed by paralysis. The child was far from any source of human contagion, and had rarely seen any other children. The father stated that two kittens had recently died of what seemed to be the same disease, and the child nursed them, frequently kissing them. Coleman does not doubt that the diphtheria was contracted from them. Geo. Turner states⁵⁹ that a cat fed with the refuse food of some children sick with diphtheria also suffered severely with what seemed the same disease. A. Jacobi relates the following example: Three kittens were allowed to remain with five children sick with diphtheria. The kittens sickened and died, and a post-mortem examination revealed the presence of the diphtheritic pseudo-membrane in their throats. The identity or non-identity of avine and human diphtheria has attracted considerable attention and discussion. Avine diphtheria is characterized by a membranous exudation on the buccal and pharyngeal surfaces, sometimes extending into the laryngeal duct, the nasal fossa, and to the under surface of the eyelids. This disease is very contagious in the feathered animals, and epidemics of it have occurred among the birds at the Jardin d'Acclimation, but without, so far as ascertained, its communication to any of the attendants. Moreover, in the London Central Markets pigeons are forced to take food by "mouth to beak feeding," in order to fatten them, and although these birds often have diphtheria, not one of the attendants who feed them has been known to contract the disease. Moreover, it is stated that the bacillus in the fowl diphtheria differs in some particulars from that in human diphtheria; so that doubt has been raised in regard to the identity of avine and human diphtheria.

Recently, Cagny²⁴ has also related cases showing the propagation of diphtheria from the feathered tribe to man. Roux and Yersin state that the microbe in the disease of birds differs from that in human diphtheria, but it may change somewhat in form in passing from one animal to another. Certainly, the two diseases sustain an intimate relation to each other.

Bilhaut states²⁴ that a pigeon-fancier had lost several of his birds by disease. He endeavored to save one of them that was

sick by allowing it to pick food from his tongue. The pigeon died, and an examination showed that it died from diphtheria. Before its death the man sickened with diphtheria and pseudo-membranes formed underneath his tongue on either side of the frænum, where the bird had picked its food, and also from the tonsils. The patient recovered, but diphtheria was communicated to his son, aged 5 years.

Many observations during the last few years have shown that milk affords a favorable nidus for the propagation of the bacillus of Loeffler, and that occasionally epidemics are produced by an infected milk-supply.

Gooch,²_{Mar.} has described an outbreak of diphtheritic tonsillitis in Eton College. The disease was traced to the milk-supply. The cows furnishing the milk drank water which contained sewage from a neighboring farm. The investigation showed that the milk, when boiled, was harmless, since the boiling destroyed the germs, but when used unboiled the disease was communicated. The cows were removed to another pasturage, where the water-supply was different, and the epidemic ceased. It was believed by those who investigated these cases that the germs which caused the disease passed from the stomach of the cow into the system, and were excreted in the milk. The manifestation of diphtheria in the boys of the college was limited to the tonsils, and it seemed that this diphtheritic tonsillitis was less contagious than ordinary diphtheria, as no one contracted the disease by exposure to the persons of those affected. It was, in all instances, propagated by the milk-supply. If the disease were true diphtheria, it was probably a mistake to suppose that the germs were secreted in the milk.

Vitality of the Klebs-Loeffler Bacillus.—D'Espine and E. de Mariquat state that cultures kept sixteen months have retained their primary virulence.¹⁸⁹⁷_{Jan., Feb.} M. Sevestre quotes instances in which the contagium of diphtheria, after being latent for long periods, communicated the disease. Thus, a girl, in a locality where there was no diphtheria, examined the clothes worn by her mother, who had died of this disease two years previously, the clothes having been in a chest during this time. After about the usual incubative period, she was attacked with diphtheria. A brush used for swabbing the throat of a child having diphtheria was wrapped in paper and laid aside. Four years subsequently, a man having

simple sore throat made an application to it with the brush, and his fauces soon after became the seat of a diphtheritic exudate. A severe and fatal epidemic of diphtheria occurred in a Norman village. Twenty-three years had elapsed, and no recent case of diphtheria had occurred in or near the place, when excavations were made in the grave-yard, and the bodies of those who had died of diphtheria, nearly a quarter of a century previously, were disturbed. The son of the grave-digger, who had collected the bones of the victims of diphtheria, and had piled them together, was immediately afterward attacked with this disease. He was the first patient in the epidemic which followed. Sevestre cites other cases, showing the remarkable vitality of the Klebs-Loeffler bacillus, which, it is probable, from observations, may remain latent not only for months, but years, and subsequently become active under favorable circumstances. ⁷³
_{Mar. 3}

Diagnosis.—In a recent clinical lecture in the Hôpital des Enfants Malades, Paris, Jules Simon, ¹⁴_{June 12} said that diphtheria may be designated a pseudo-membranous affection, having its seat by preference in the upper part of the air-passages; and characterized by the presence of the bacillus discovered by Klebs. Every false membrane which does not contain this bacillus, whatever may be its aspect, its location, and its structure, is not a diphtheritic product. In order to clinically distinguish these non-diphtheritic products from those of diphtheria, Simon takes a doubtful pseudo-membrane and agitates it gently in water; if it does not fall apart, but remains in resisting and elastic layers (feuilletés), there is no doubt that it is diphtheritic. He also examines the fauces of the patient, and, if the false membrane is not limited to the tonsils, but covers the pillars and arch of the palate and, more or less, the uvula, the disease is diphtheria. In the immense majority of cases these characteristics indicate the presence of diphtheria, but the nature of the disease can be positively ascertained by the presence or absence of the bacillus. Take the following instances: the skin has been denuded of its epidermis by injury; a pellicle forms upon it, resembling in color the coagulated white of the egg, thick, slightly adherent, and the skin surrounding it neither red nor elevated; or this new product may be thin, adherent, and the surrounding skin red, elevated, and œdematous. It is important to determine early the character of the pseudo-membrane, in order

that, if it be diphtheritic, proper prophylactic and therapeutic measures may be employed. A bacteriological examination enables us to determine the nature of the disease at the very beginning, for if the Klebs-Loeffler bacillus be present it is diphtheria.

Mucous patches occurring upon the fauces in the syphilitic present a grayish appearance, and if a patient having these take an acute inflammation of the fauces the mucous membrane surrounding the syphilitic growth has a red and swollen appearance. The presence or absence of the Klebs-Loeffler bacillus will determine the diagnosis. In the scarlatinous the angina may take on a membranous diphtheritic appearance. A pseudo-membranous angina occurring in the beginning of scarlet fever is not ordinarily dangerous. It is rarely complicated with croup, but if it occur toward the close of scarlet fever it has often been seen to enter the larynx or destroy the patient by blood-poisoning.

Sevestre,¹⁴ states that patients having pseudo-membranous pharyngitis at the beginning of scarlet fever do not communicate diphtheria, do not become croupy, and are readily cured of the angina. Wurtz and Bourges, in studying the pseudo-membrane at the beginning of scarlet fever, found it destitute of the bacillus of Klebs, and consequently non-diphtheritic; hence the relative benignity of the early angina of scarlet fever. On the other hand, in the pseudo-membranous pharyngitis occurring at a late stage of scarlatina, they often found the Klebs-Loeffler bacillus, showing its diphtheritic nature. The investigations of Chantemesse have led him to the same opinion, to wit, that the pseudo-membrane occurring upon the faucial surface at the beginning of scarlet fever does not contain the bacillus, but it is often found in the pseudo-membrane developed in a late stage of scarlet fever. Therefore the diagnosis of diphtheria without the help of bacteriology is often uncertain, and the following cases may be cited as showing the precision in diagnosis which is furnished by the search for the bacillus of Klebs. A child of $3\frac{1}{2}$ years of age entered the pavilion Trousseau, having in his fauces grayish patches of pseudo-membrane which had continued six weeks and were constantly reproduced, notwithstanding treatment. The clinical features of the case indicated a severe diphtheritic angina. Roux examined the pseudo-membrane and did not find the bacilli of Klebs, and said; "This child has not diphtheria." At the same time, in the

same ward, was a child having pseudo-membranes in his fauces and a hoarse cough, so that a grave prognosis was given. Roux in this case also found no bacillus, which rendered the prognosis more favorable. Both these patients recovered. Formerly Trousseau said that there are pseudo-membranous anginas which do not give rise to croup and are not diphtheritic. Unfortunately, on the other hand, we have often seen anginas which seemed benign at first, but finally presented a diphtheritic character and became fatal. In diphtheria, at the point where the pseudo-membrane is implanted on the mucous surface, we find granular liquid fibrin in which is an abundance of the Klebs-Loeffler bacillus. We find this bacillus also in the meshes of the pseudo-membrane, associated with a large number of other micro-organisms, especially the streptococcus and staphylococcus. Just as in suspected kidney disease we examine the urine for glucose or albumen in order to obtain an accurate diagnosis, so in all forms of pseudo-membranous angina we should examine for the Klebs-Loeffler bacillus; since, even if there be a very small amount of pseudo-membrane, the presence of this bacillus justifies the diagnosis of diphtheria, and if this bacillus is abundant a grave prognosis is justified. L. E. Holt¹ has contributed an interesting paper showing the obscurity or latency of diphtheria and the difficulty of diagnosis in certain cases. A rachitic child of 2 years had been steadily improving until January 7th, when a profuse nasal discharge began which was tinged with blood, and once or twice after syringing was attended by considerable hæmorrhage. The nasal discharge continued abundant and muco-serous, but no pseudo-membrane was visible until two weeks had elapsed, when a minute spot was seen on one tonsil, and four days later an exudate of the size of a split pea upon the other tonsil. It was not until the twentieth day that the pseudo-membrane was visible in the nares. Death finally resulted.

Holt relates the case of an infant that was exposed to the one whose history has been related. It had a nasal discharge of mucus and blood twenty-nine days without other symptoms of diphtheria. Then œdema of the extremities occurred, followed by death on the thirtieth day. There was no visible pseudo-membrane at any time. At the autopsy, extensive parenchymatous nephritis, old thrombi in the heart, a patch of diphtheritic pseudo-membrane an inch in diameter upon the naso-pharynx, and another of smaller

size low down in the pharynx, were discovered. It does not appear, from the report of the above cases, that a microscopic examination was made of the faucial or nasal secretions in order to ascertain whether the Klebs-Loeffler bacillus was present. Its presence in a doubtful case would, in the light of our present knowledge, render the diagnosis of diphtheria certain.

Prognosis.—The mortality from diphtheria continues large, notwithstanding the fact that its treatment has been more discussed in medical societies and journals during the last ten years than that of any other disease. It would seem as if, from the large number of remedies employed by different physicians, that almost every therapeutic agent had been used which would be likely to be of any use. Nevertheless, the percentage of deaths from diphtheria, in every country where the type is severe, continues so great that this disease, more than any other of childhood, checks the increase of population. Henoch³⁴_{Oct. 21, '90} states that in 110 cases of pharyngeal diphtheria recently treated by him 32 died. According to his observations the adenitis usually abates without suppuration, and the degree of fever throws little light on the prognosis. The appearance of the pseudo-membrane on the hard palate, cheeks, tongue, lips, genitals, and arms increases the gravity of the prognosis. Diphtheritic nephritis appears from the third to the fifth day, and is characterized by the presence in the urine of tube-casts, epithelium, and a few red blood-cells. The appearance of albumen at a late period of the disease is unusual. In severe cases the various modes of treatment in Henoch's practice have been ineffectual.

The following are the statistics of Kohts¹¹⁴_{No. 17} relating to the prognosis in diphtheria: In 5072 children treated in the child's *clinique* in Strasbourg from 1878 to 1889, 938, or 21 per cent., had diphtheria, of which cases 439, or 46.7 per cent., died. Of the 499 not tracheotomized, 167, or 33.5 per cent., died. The principal complications were nephritis and paralysis.

Jules Simon¹⁴_{June 15} remarks that if a microscopical examination shows that the Klebs-Loeffler bacillus is abundant in the exudate or upon the inflamed surface, the prognosis is worse than when the bacillus occurs in small number and other microbes predominate.

As many observers state, thermometric observations aid but

little in prognosis, for the temperature is often but little elevated in profound and fatal blood-poisoning, and it may be considerably elevated in the beginning of diphtheritic as well as of non-diphtheritic anginas which result favorably. We may base a favorable prognosis on the limitation of the inflammation to the faucial surface or its absence from the nares and larynx, the preservation of the appetite and digestion, the absence of albuminuria, and a strong and normal but moderately-accelerated heart-beat. On the other hand, increasing pallor; much tumefaction of the faucial surface, with a diphtheritic exudate, not only covering the tonsils, but the lateral and posterior faucial surface, as well as the uvula and velum; the occurrence of a diphtheritic pellicle in the nostrils, with a muco-purulent discharge; anorexia; the occurrence of casts and albumen early and increasing in the urine; a weak heart and paralytic symptoms; and hoarseness, indicating laryngitis, should excite grave apprehensions of the result.

State of the Heart in Diphtheria.—In many instances death is attributed to heart-failure or cardial paralysis. Hence the state of the heart has received much attention on the part of those who have investigated the anatomical characters of the disease. In 1873 Mosler found fatty degeneration of the cardiac muscular fibres in 2 children who died with symptoms of collapse in diphtheria. Rosenbach also made microscopic examinations of the heart in 4 children, who, during life, had exhibited marked cardiac symptoms, and he detected more or less fatty change in the muscular fibres and a waxy degeneration, wide-spread and severe.

Leyden, in 1882, investigated the state of the heart in 3 cases. One died of heart-failure during the progress of diphtheria, and another of the same cause during convalescence. In both cases he found an abundant infiltration of cells in and between the muscular fibres and around the vessels. In both there was also some fatty change in the cardiac muscle, but more in the one case than in the other. In the third case similar changes were also observed. Oertel states¹¹³³ that in severe diphtheria extravasations of blood and collections of cells occur between the cardiac muscular fibres; and when the case is severe and lasts long, if death occur suddenly from cardiac paralysis, the muscular fibres of the heart are pale, soft, easily torn, and with scattered extravasations of blood in their substance. They are affected with advanced

fatty degeneration. In 1882, Guttman found in diphtheria and in other infectious diseases cloudiness of the muscular fibres of the heart, and in 1888 Huguenin reported 2 cases of diphtheria in which myocarditis was diagnosticated during life. The one, a girl of 19 years, died on the fifteenth day of diphtheria, from syncope, and the other, a man of 25 years, died during convalescence with symptoms of cardiac debility. In both cases wide-spread cell-infiltration was found in the myocardium, even in the walls of the vessels, along with degeneration of the muscular fibres and swelling of the muscle-nuclei. Aided by these observations, Schemer^{26 Oct. 1} made microscopic examination of the heart in 13 cases which occurred during an epidemic in Göttingen in the winter of 1889-90. In 9 of them tracheotomy had been performed. In 8 of the 13 cases death resulted from cardiac weakness, in 4 it resulted from extension of the pseudo-membrane into the bronchial tubes, and hæmorrhagic pneumonia was found in the remaining case. Conjunctival diphtheria was present in one of these cases, and nasal diphtheria in at least one other.

In the heart the following changes were discovered: fatty and granular degeneration of its muscular fibres, with swelling and increase of its nuclei; hyaline degeneration and atrophy; connective tissue of the heart rich in cells, and, in 2 cases, extravasation of blood. Fatty and granular changes were seen in every instance, slight in some, especially when death had resulted from obstruction in the respiratory passages, but great or considerable in others; so that the action of the heart must have been much weakened in consequence. In 1 case the microscope showed advanced fatty changes, and so general that scarcely a muscular fibre had escaped, and abundant cell-infiltration had occurred in the intermuscular connective tissues. Some of the fibres had undergone hyaline degeneration. The myocardium presented a bright, yellowish-red color, and there was the appearance of subendocardial hæmorrhages in the left ventricle. The morbid changes occurring in these cases corresponded almost exactly with those described by Orth as occurring in many cases of infectious diseases, and which he believed resulted from a myocarditis.

State of the Kidneys.—Albuminuria in diphtheria is known to result in most instances from nephritis, but in certain cases it has a different origin. Bouchard has shown that occasionally

toxic agents in the blood cause pathological albuminoid products, which are conveyed in the blood-current to the kidneys and are eliminated by them, producing albuminuria. In some instances, also, albuminuria occurs during the dyspnoea consequent on diphtheritic laryngitis. Under such circumstances it results from the passive congestion of the kidneys, which, like that of other organs, is present when the respiration is notably obstructed. The congestion and albuminuria pass off when the normal circulation is restored by intubation or tracheotomy.

Prophylaxis.—Grancher and other accurate observers relate instances to show that the area of contagiousness of diphtheria does not extend beyond the immediate vicinity of the infected person or object. Dumez states that an epidemic of diphtheria occurred in a school-room in which the boys occupied one side and the girls the other, with the desk of the teacher between them. Diphtheria, introduced by a small girl, prevailed among the girls, but every boy escaped. Other instances are related by different observers showing that the contagiousness of diphtheria extends only a short distance. On the other hand, as is well known, and as many observations have shown, the diphtheritic germs have a prolonged vitality, and remarkable fixity or attachment to persons or objects. Darolles has reported the case of an infant who apparently contracted diphtheria from lying in a cradle in which a child had died from this disease two years previously. A knowledge of these facts will aid in the proper employment of prophylactic measures. A. Caillé, of New York,¹¹¹⁶ read an instructive paper on the prevention of diphtheria. He stated that, in proposing measures designed to prevent diphtheria, attention should be given to the schools, family residences, street-cleaning, and personal prophylaxis. The schools are the centres of diphtheritic infection, and one or more sanitary inspectors should be employed in each school. He should superintend the sanitary state of the school, and should every morning examine the throat of every child attending the school. The child should be taught to depress the tongue with his or her finger. Every child with sore throat, nasal catarrh, or other evidences of disease should be sent home with advice to the parents to employ a physician. An inspector could in this manner, says Caillé, examine five or six hundred children between 8 and 9 A.M.

Since, as observations in all countries have shown, the microbe which causes diphtheria finds a residence for its development and propagation in filthy accumulations of all kinds, the utmost cleanliness of domiciles and adjacent yards and streets should be maintained, whatever the trouble and expense, in any locality afflicted by diphtheria.

Personal prophylaxis should also never be neglected. The New York Health Board has instructed that "persons in contact with patients sick with diphtheria should use disinfectant gargles under the direction of a physician." A saturated solution of boracic acid has been used with apparently good results, both as a disinfectant gargle and nasal douche. This treatment, employed in the nursery and child's hospital, was followed by a marked diminution in the number of diphtheritic cases.

School-rooms, theatres, dispensaries, hospitals, asylums, and other places of resort should be disinfected at stated intervals by washing the ceilings, walls, and floors with a solution of corrosive sublimate, followed by calcimining, painting, or, in the poorer buildings, by whitewashing. The importance of sanitary plumbing, so that no sewer-gas escapes into a room occupied by children, is now fully recognized, since, in the cities where diphtheria is endemic, the filth of the sewers is a nidus in which the Klebs-Loeffler bacillus is propagated, and in numberless instances the sewer-gas infected by this bacillus, escaping into an apartment, has caused an outbreak of diphtheria.

One of the chief modes in which diphtheria is propagated is by walking cases. At my clinics in Bellevue Hospital College, where children are brought from all parts of the city and from adjacent cities for treatment, I not infrequently found those with diphtheria sitting among other children waiting their turn for treatment. Children with mild diphtheria ride in the city cars and stages, frequent the public parks, and sit on benches with other children; attend not only the public schools, as Caillé has so well pointed out, but the Sunday-schools and churches; and are carried to the physician's office, where other waiting children as well as the physician's family, are exposed to them. In many instances, in New York City, physicians' families have been desolated by diphtheria contracted from walking cases which sat in their office during office hours or even between them. What

prophylactic measures can be employed to prevent this mode of exposure? I see no way except by the joint action of family physicians and health boards. Families should be instructed by their medical advisers and directed by the health authorities not to allow any child with the least sore throat to leave its home, and it should be isolated from other children of the household until the nature of its ailment is determined; and, if it be diphtheritic, however mild, or of a doubtful character, strict isolation should be maintained and efficient disinfection, personal and domiciliary, should be employed. It would be better for the community, and the prevalence of diphtheria would be greatly diminished, if sore throats were regarded with some of the horror which the name small-pox or leprosy produces.

What prophylactic measures shall a physician recommend and employ when summoned to a case of diphtheria? The following may be confidently recommended as consonant with the views expressed by recent writers on this subject: All articles not required in the sick-room should be removed. All furniture not needed—curtains, pictures, books, or primers—should be excluded; or, if the attack be mild, and the patient be allowed to handle toys or primers, they should be subsequently burnt. The physician examining the patient should avoid any unnecessary exposure to his own person. He should stand behind or by the side of the patient while he inspects the fauces, since depression of the tongue usually excites a forcible cough, which is likely to expel particles of pseudo-membrane or muco-pus, which, if the physician stands in front of the patient during examination, is likely to lodge on his own person, and may communicate diphtheria to other children whom he subsequently visits. Thus, during the last month, a New York physician has informed the writer that he recently sat in front of a child whose fauces he was inspecting, and was conscious that some of the infectious matter was expectorated into his face and beard. Returning to his home, he communicated fatal diphtheria to his own child. Such distressing experience might, to a considerable extent, be avoided if the physician in attending a case approach no nearer the patient than is necessary for an adequate examination, bathe his hands, face, beard, and hair with a solution of corrosive sublimate, or other disinfectant, when he leaves the sick-room, and in subsequent visits to children approach no

nearer the bedside than is necessary for adequate examination. I have, during the last two or three years, carried tablets of corrosive sublimate for the purpose of personal disinfection. From the first visit of the physician, measures should be taken to purify and disinfect the air of the sick-room by ventilation and vaporation of some disinfectant. Jules Simon recommends the constant admission of fresh air through an open door leading into an adjoining room, and a window partly open in that room. I know no better disinfectant for constant employment during the progress of the case than a mixture of oil of eucalyptus, carbolic acid, and turpentine, according to the following formula:—

R. Ol. eucalypt.,	. . . . .	℥j	(31 grammes).
Acidi carbolic,	. . . . .	℥j	(31 grammes).
Spts. terebinth.,	. . . . .	℥viij	(249 grammes).

Add 2 tablespoonfuls to 1 quart of water for constant simmering over stove. I have elsewhere recommended this for both scarlet fever and diphtheria. After a favorable case has terminated, every portion of the surface of the patient should be sponged with a disinfectant and a complete change of apparel employed before he be allowed access to other children. In a fatal case, which I saw in consultation, the disease was probably contracted by embracing a comrade in the street, who was allowed to leave the house for the first time after an attack of diphtheria. The disinfection of the sick-room when vacated by the patient is a matter of great importance.

Probably there is no better method than that recommended by Prudden, to wash the ceiling, walls, and floor of the room with a solution of corrosive sublimate, after rubbing the walls with slices of bread, which gather up the microbes. If this be followed by calcimining, whitewashing, or painting, the prophylaxis would be more complete and certain. I have elsewhere treated of the inadequacy of disinfection by burning sulphur, as employed by the health boards. Any of the necessary articles of furniture or the bedding should be either placed in boiling water or be sponged with the corrosive-sublimate solution. Finally, greater care should be exercised in the use of the Fresh-Air Fund, employed for the purpose of sending poor children into the country. In a considerable number of instances these beneficiaries, coming from tenement-houses, or their infected clothes, have, from accounts

received, communicated diphtheria to benevolent and sympathetic families in country towns.

Treatment.—The tincture of chloride of iron continues to be used in all countries as one of the chief remedies in the treatment of diphtheria, but the doses employed for children vary from those of moderate size to a quantity which would be considered large for adults. More importance is attached to its local action upon the faucial surface as an astringent and antiseptic than formerly, and children old enough are frequently instructed to gargle with it before swallowing it. The prescription most commonly used for diphtheria in America and Great Britain, until within the past two or three years, has been the tincture of the chloride of iron in combination with the potassium chlorate; but the opinion is rapidly gaining ground that the latter is a dangerous remedy in diphtheria, and of little if any efficacy. There is a growing belief that this agent, from its irritating action on the kidneys, increases, if employed in diphtheria, in large or frequent doses, the frequency and severity of the nephritis which so often complicates the disease. There can be little doubt that this medicine should be discarded in the treatment of diphtheria, or given in very small doses along with the iron.

R. W. S. Barraclough⁶ says that the local treatment which he has found the most efficacious and reliable is the application of the liquor ferri perchloridi fortior (liquor ferri chloridi—U. S.) to the fauces. This preparation of iron has four times the strength of the official United States tincture of the chloride of iron. He applies this three or four times daily with a large camel-hair pencil, so that it reaches every portion of the diphtheritic pellicle, and on the inflamed mucous surface underneath. He believes that it exerts a powerful astringent as well as antiseptic action.

In my opinion the liquor ferri chloridi, as well as the tincture of the chloride of iron, is too irritating if used without dilution, increasing the inflammation, and therefore injuring instead of benefiting the patient. The liquor ferri chloridi should, in my opinion, be reduced by adding 10 or 12 parts of water or glycerin and water to 1 of the medicine.

Jules Simon⁸ proclaims the necessity of energetic local treatment. He winds absorbent cotton around the ends of the two forceps, so as to make swabs of about the size of olives. With one

he brushes away the saliva and muco-pus, and with the other, saturated with the wash, he attacks the pseudo-membrane and the adjacent inflamed surface. He uses sufficient force to detach particles of the pseudo-membrane that are slightly adherent, but not so as to injure the mucous surface. The application with the brush is made every hour during the day and three times in the course of the night. The following is the formula which Simon usually employs for brushing the fauces:—

R Acidi salicylici, gr. viiss-xv (0.05 to 0.10 gramme).
 Spts. rect., q. s. for solution.
 Glycerini, 3x (39 grammes).
 Infusionis eucalypti, . . 3xv (58 grammes).—M.

When the pseudo-membranes are very thick and adherent, Simon applies from two to four times each day equal parts of the chloride of iron and glycerin.

D'Espine, of Geneva,¹⁹⁷ has observed the destructive effects of various parasitocides on the Klebs-Loeffler bacillus: Benzoate of sodium, 5 to 10 parts in 100; chlorate of potassium, 5 parts in 100; boric acid, 4 parts in 100; sulphuret of sodium, $2\frac{1}{2}$ to 5 parts in 100, in contact with the bacillus five minutes did not arrest its development. Under similar conditions it was arrested by corrosive sublimate, 1 part to 8000; by carbolic acid, 1 part to 50; by salicylic acid, 1 part to 2000; by chloral, 1 part to 200; and permanganate of potassium, 1 part to 2000. Of these different medicaments employed locally in the treatment of diphtheria, D'Espine recommends salicylic acid, since its toxic properties are slight and its application is readily made. He says that the solution employed should be $1\frac{1}{2}$ to 2 parts to 1000, but in very young children it is well to reduce the proportion to 1 part in 1000 or even in 1500. In children old enough it may be used as a gargle. It should be employed every hour to two hours. This solution may also be advantageously employed in the nostrils by a nasal syringe.

Burghardt,⁶⁰⁸ prescribes equal parts of the flowers of sulphur and quinine in the local treatment of diphtheria. The powder is blown upon the false membrane, after which, if the disease is in the pharynx, the patient is not permitted to swallow anything for an hour and a half. As a prophylactic the powder is also insufflated into the nasal cavities, even when these parts are not infected.

Of the 33 cases treated in this manner by Burghardt all recovered, and in none was the powder applied oftener than twice daily. Internally, the tincture of the chloride of iron was given with wine, brandy, and milk.

Schendel⁴ recommends for diphtheria the *tinctura rusci composita*, made from the *oleum rusci* and *oleum fagi* with dilute spirits.

It seems to have no effect on the kidneys and the general state, given in hourly doses during the day and every second hour during the night. Schendel states that the general symptoms disappeared after three or four doses. At the same time the diphtheritic exudate became yellow and soon fell off, exposing a granulating surface. Schendel has employed the tincture in 43 cases. In 25 of them the disease was mild and recovery took place in three or four days. Of the remaining 18 cases, which were severe, 15 recovered without complications, 1 was tracheotomized, and 2 died.

W. C. Wile, of Connecticut,⁶¹ recommends, for the treatment of diphtheria, the internal administration of corrosive sublimate every two hours, and the application of sulpho-calcine to the pseudo-membrane. The sulpho-calcine is a liquid of a dusky-red color, made by combining oxide of calcium, the *flores sulphuris loti*, *oleum eucalypti globuli*, *oleum gaultheriæ*, benzo-boracic acid, and the *extractum pancreaticum*. Wile applies the undiluted sulpho-calcine by means of absorbent cotton wound around a stick every half hour or hour to the diphtheritic patch, and those old enough he frequently gargles with one tablespoonful of the sulpho-calcine to a gobletful of water. Wile states that while the sulpho-calcine is harmless if swallowed, and not injurious to the tissues, it is the most powerful solvent of diphtheritic pseudo-membranes known to the profession. Dixon, of Henderson, Kentucky,⁶⁸ strongly recommends the sulpho-calcine, using the application to the fauces of equal parts of sulpho-calcine, glycerin, and water. Of 28 cases thus treated only 1 died.

Waugh, of Philadelphia,⁷⁰ states that in a case of malignant diphtheria he applied sulpho-calcine in full strength to the pseudo-membrane and diluted to the nares every hour. The child recovered, though slight epistaxis took place. I have employed the sulpho-calcine in a few instances as a spray, and find it very disagreeable to the patients on account of the sulphur products. Used

in the strength just recommended, it seems to be too irritating, so that in the last cases in which I have employed it it had only one-seventh the strength of the pure medicine. The sulpho-calcine, as already stated, consists of oxide of calcium from oyster-shells, washed sulphur, oil of eucalyptus, oil of winter-green, benzo-boracic acid, and pancreatic extract. It is designed to be used only locally by the atomizer or camel-hair pencil, or as a gargle, with but little dilution. Its use is too recent to enable us to determine whether it possesses any advantages over, or is more efficient than, other less nauseating remedies in common use.

V. Babes,²⁰ made experiments with various agents upon the cornea of a rabbit inoculated with Loeffler's bacillus, in order to ascertain their prophylactic or therapeutic action as regards diphtheria. The application of 20-per-cent. solution of carbolic acid did not check the formation of the pseudo-membrane, nor did a 10-per-cent. solution of citric acid, nor a 5-per-cent. solution of acetic acid. But corrosive sublimate, 1 part to 4000; potassium permanganate, 1 part to 1000; alcohol, 1 part to 5; chloral, 1 part to 50; and boracic acid, 1 part to 20, prevented the formation of the diphtheritic pellicle, and did not irritate. Raulin,⁹ Jan. 10, 71 recommends, in the treatment of nasal diphtheria, the removal of pseudo-membrane by antiseptic irrigation, and to prevent its reformation the surfaces on which it grows are covered by the following:—

R Lactic acid,	30 grains (2 grammes).
Carbolic acid,	45 grains (8 grammes).
Pure glycerin,	1 ounce (31 grammes).—M.

After the disappearance of the exudate, the catarrhal rhinitis is best treated by astringent applications and by washing out the nostrils with a solution of borate of sodium or Dobell's solution.

The following formula, recommended by me some years ago, is employed by a considerable number of physicians, and the reports of its use are very favorable:—

R Acidi carbolic,	gtt. x
Liq. ferri subsulphatis,	ʒij (12 grammes).
Glycerinæ,	ʒj (31 grammes).—M.

Add an equal or double quantity of water, and apply to the fauces with a camel-hair pencil every four hours.

This is a powerful astringent and germicide. It is very penetrating, it strongly contracts the pseudo-membrane, and it brings

away the foul secretions of the fauces and particles of the diphtheritic exudate.

Time has determined more accurately the proper mode of employing corrosive sublimate,—the most powerful germicide in use. A solution of 2 grains (0.13 gramme) to the pint (500 grammes) of water may be advantageously employed for brushing the fauces and syringing the nostrils every two hours. When administered internally, its maximum dose should probably be not above $\frac{1}{8}$ grain (0.002 gramme) every two hours for a child of 3 to 5 years.

J. L. S.

CROUP.

Brühl and Fahr, in an exhaustive statistical review,¹¹³⁴ arrive at the conclusion that the disposition to this disease—croup—is increased by alternations of dry and moist air.

Diagnosis.—According to Pieniazek,³⁶⁶ it is not always possible to obtain a view of the glottis in cases of suspected croup; therefore we have often to rely on the presence or absence of croupous exudate on the epiglottis, or on the tips of the arytenoids, for assistance in making a diagnosis. In one class of cases the cause of the stenosis lies only in the immobility and median situation of the vocal cords and the arytenoid cartilages, which are held together by false membrane in the interarytenoid space. In another class the stenosis is influenced by swelling of the mucous membrane under the glottis. Occasionally it is caused by the swelling under the glottis alone, the cartilages being normally movable; and in such cases the interarytenoid space is free from croupous exudate.

Doukin,⁶ maintains that nearly all cases of membranous croup are diphtheritic; while Carl Seiler¹¹ differentiates membranous croup and diphtheria by the following points: The membrane of diphtheria is of a yellowish hue, the temperature of the body rather high, and the membrane is apt—in fact, certain—to curl up at the edges; while in membranous croup the membrane is white, does not curl at the edges, is devoid of all peculiar odor, and the temperature is rather low.

Battams⁶ cites the following as some of the difficulties of diagnosis: 1. Cases associated with *measles*: (a) cases of more or less urgent laryngeal dyspnœa before the rash appears—catarrhal laryngitis? (b) laryngeal dyspnœa coming on at a later stage of

measles. Such cases, we believe, are always membranous; are they also diphtheritic? 2. Cases associated with *scarlet fever*: (a) children who, when first seen, are apparently suffering from a typical pharyngeal diphtheria, but who develop a scarlet-fever rash in a day or two; (b) cases in which, at a later stage of scarlatina, membrane develops in the pharynx, or laryngeal symptoms occur, the latter symptoms always being due to a membranous laryngitis. Are they also diphtheritic? 3. Cases of laryngeal dyspnoea more or less urgent, but without obvious naso-pharyngeal signs suggestive of diphtheria, without marked swelling of the cervical glands, and with an absence, or trace only, of albumen in the urine. Earling⁶¹_{July} declares that his experience in an extensive practice since 1848 has proved, beyond a doubt to his mind, that croup is only a form of diphtheria.

Complications.—Vergel,²_{Aug. 22} recently reported a case of a child, 18 months old, suffering from croup, whose throat he was examining by depressing the tongue with a spoon, in which syncope and convulsions occurred, the child remaining ten hours in a torpid state and recovering slowly. Bouchut has reported 2 cases of death from pressing down the tongue, and to avoid such accidents it should be done during expiration.

Treatment.—Sallavardin,²¹¹_{Nov. 15} advocates the employment of the cyanide of mercury and the bichloride of mercury in nasal and in pharyngeal diphtheria, and bromine and bromoform in laryngeal diphtheria or croup, and arsenic in gangrenous diphtheria. Rothn⁸⁶⁸_{Mar.} reports a case of a child with true croup in which intense dyspnoea was present, and, before resorting to tracheotomy, inhalations of vaporized calomel, 30 grains (2 grammes), were resorted to with entire success; in ten minutes the patient was quiet and comfortable and without dyspnoea. The next day the same symptoms re-appeared, and like treatment was resorted to with entire success; on the fourth day the child was convalescent.

A writer¹⁷⁶_{Nov.} advises quinine in doses of 2 grains (0.13 gramme) for children from 2 to 6 years of age at the beginning of the croupy attack; and, to arrest the formation of membrane, the administration of calcium sulphide in doses of $\frac{1}{10}$ to $\frac{1}{20}$ grain (0.006 to 0.003 gramme), to be given dry on the tongue every hour or two, for which method the writer claims a prompt arrest of the disease.

S. L. McCurdy²⁸³ claims that his experience with turpentine in membranous croup justifies him in pronouncing upon its extreme value among the remedies to be employed in combating this dread malady; he advises that the drug should be administered in drachm doses (4 grammes), repeated every hour for from four to six doses, then suspended for six or eight hours. The membrane becomes of a muddy-yellow color, and is thrown off. If this change does not take place, recourse should be had again to the turpentine for three or four doses.

Denby²² claims that the acute catarrhal laryngitis tends to develop into membranous laryngitis; following Henoch, he advises confinement in bed until the cough has lost its croupy character, the use of the steam-kettle with a small percentage of carbolic acid, hot sponging and hot compresses, cold wet compresses, emetics, diaphoretics, and expectorants, with the addition of iodide of potassium, $\frac{1}{2}$ to 2 grains (0.03 to 0.13 gramme), and a few whiffs of chloroform if there is much spasm. A sedative expectorant is useful in the very young, thus avoiding restlessness. If the case is desperate, two to six leeches over the manubrium sterni, a reliable emetic, and inunctions of mercurial ointment, 10 grains (0.65 gramme), twice or three times daily, may be resorted to.

In cases of membranous laryngitis, Denby, while recognizing the advantages of the steam-kettle and tent, claims that too much steam may be used, to the exclusion of the oxygen which is necessary to the patient in cases of dyspnœa, and he prefers hot wet compresses to cold ones. Antimony in full doses every two hours holds the first place among the medicinal agents. When an emetic is indicated, Denby finds cupri sulphatis, $\frac{1}{2}$ to 1 grain (0.02 to 0.06 gramme), the most reliable, but dissuades from a frequent repetition of emetics, in a child who is already exhausted, merely because of the return of attacks of suffocation, and lays great stress upon the employment of nourishment and stimulants. In cases of diphtheritic croup with pharyngeal deposit, he syringes the throat with a solution of boracic acid, 1 to 2, or sulphite of magnesia, 1 to 10, and advises the following, devised by J. Lewis Smith:—

R Ac. carbol.,
 Olei eucalypti, ʒj (31 grammes).
 Spts. terebinth., ʒvj (187 grammes).

M. Sig.: To be mixed with water in the proportion of ʒj to Oij (31 grammes to 1 litre), and let simmer over the fire, in a broad, shallow dish, constantly.

This acts locally on the inflamed surface, producing local disinfection and systemic disinfection by entering the blood and tissues generally, likewise affording protection to others, which fact has been demonstrated many times.

Denby, strikingly at variance with American writers, says that the results arrived at by intubation are by no means so gratifying as to enable it to take precedence over tracheotomy. The value of his testimony, however, is somewhat lessened by the fact that he admits that, personally, he has had no experience with intubation.

Brothers,¹ recommends tracheotomy in place of intubation in (1) cases in which, owing to spasm or œdema of the glottis, the tube cannot be introduced by the O'Dwyer method; (2) cases in which the tube enters the larynx, but pushes the membrane ahead of it; (3) cases of ascending croup, in which the lower and larger opening of tracheotomy allows the membrane and the secretions a better avenue of escape.

Denby advises that when tracheotomy is employed recourse should be had to it early in simple membranous croup, agreeing with Henoch that the onset of the first threatening attack of suffocation—in fact, even the forcible indrawing of the lower part of the chest-wall on inspiration—is the signal for tracheotomy. The contraindications for treatment are: bronchial croup, severe pneumonia or capillary bronchitis, extreme prostration without asphyxia. In cases of laryngeal or pharyngeal diphtheria he does not hurry to operate; in many cases of diphtheritic croup the membrane begins to loosen spontaneously and to be thrown off between the fifth and seventh days.

PERTUSSIS.

According to Burman,⁸⁶ in explanation of the greater frequency and severity of nocturnal paroxysms of whooping-cough, and the specialized hours of their appearance, whatever the etiology of whooping-cough may be, one fact is plain: that the nervous element preponderates largely over the catarrhal. We may have irritation produced by the development of some special form of bacillus, but we have also hyperæsthesia of the terminal ends of the vagi in the lungs, such irritation taking a peculiar form in whooping-cough and giving rise to well-marked and characteristic phenomena.

Granting, then, an excitable condition of that part of the nervous system included in producing a paroxysm of whooping-cough, it is but natural to suppose that, certain conditions being favorable, the nervous mechanism inducing an attack would be more active during the night than during the day, if, as is claimed, the respiratory centre exhibits less resisting power during the night; from the fact of the gradual depression of the breathing occurring during sleep, and more particularly at certain times, when the sleep is more profound than at others, it prevents the increase of the carbonic acid in the blood from less frequent interchange, and, at the same time, facilitates the engorgement of the lungs when the propulsive power of the heart is deficient; but only to the extent of rousing the respiratory centre to an action more or less excited.

But, as has been shown, shallow respiration and insufficient oxygenation excite respiratory efforts, and, if no more air gets into the blood, expiration is accentuated and goes on in a convulsive repetition, due to the stimulation of the medulla by the venous blood; but when the centre recovers its excitability (due, no doubt, to the excessive increase of carbonic acid), inspiratory effort follows.

If, then, we have during sleep a condition favorable to the action of the causes, whatever they may be, which induce a paroxysm of whooping-cough, when shall we look for them if not at those times, when the resisting power of the respiratory centre is weakened, and to a certain extent disabled, by the condition resulting from sleep?

These conclusions were arrived at by the author (1) in thinking over and comparing the tendency of attacks of asthma and whooping-cough to occur at particular hours of the night, these hours corresponding quite closely with the times at which sleep has been demonstrated by experiment to be most profound; (2) from the fact that the state of the respiratory centre at these times is in a condition most favorable to the production of excited, explosive, or spasmodic respiratory action, according to the condition of the nervous system, induced by the respective disorders from which the patient is suffering.

Complications.—Stefano Mircoli⁴⁶⁰_{v.14, No. 1} observed, during a recent epidemic of whooping-cough, the occurrence of albuminuria in from 10 to 12 per cent. of the cases, and a mortality of 5 to 6 per cent. from acute nephritis. He believes that the urine should be

frequently examined during this disease. Trörtzky³⁶⁸_{July 21} describes 3 cases of whooping-cough accompanied by mental disturbance, difficulty in and loss of speech, and loss of power, or even paralysis, of certain groups of muscles. He considers that these conditions are due to disturbance of the circulation, and through that to morbid changes in some part of the brain. The first case was a child of 2 years, who became suddenly affected during an attack of pertussis, after a paroxysm, by distortion of the eyes, the pupils becoming dilated, and blindness occurring; contraction of the arm flexors, quiet delirium, Cheyne-Stokes respiration, and diminution of patellar reflex, of the sense of touch and of pain. At another time she became unconscious, which condition was associated with clonic contraction of the facial muscles, dilated pupils, and staring eyes. At another time a general eclamptic condition, with Cheyne-Stokes phenomena, came on, the attack lasting an hour and a half, and succeeded by stupor of twelve hours' duration. These attacks gradually diminished in frequency, and in two months the patient was well.

The second case was a boy $3\frac{1}{2}$ years old, who complained of great headache, and had difficulty in thinking and speaking during four or five weeks of whooping-cough with pneumonia.

The third case was a child of 7 months, who had two eclamptic seizures during the third week of her illness, and in the sixth week impairment of power in right arm, it becoming quite paralyzed; three months afterward the paralysis had disappeared without treatment.

Treatment.—Naegeli,²⁴_{Mar.} reports that in two children he has succeeded more than five hundred times in apparently arresting the spasms of pertussis by pulling the lower jaw downward and forward.

At the Scientific Congress of Barcelona, Carreras¹⁷_{Mar.} advised an application of resorcin to the pharynx and to the vestibule of the larynx; he also gives larger doses of chloral to allay the excitability of the superior laryngeal nerves. Guerra, of Estapé, also applies resorcin locally, and, when the cough becomes non-convulsive, derives benefit from the administration of balsams. Calatreveno administers belladonna, and employs insufflations of powdered roasted coffee and quinine mixed; also, inhalations of benzoate of soda. He gives antipyrin internally in doses of $\frac{1}{100}$ grain (0.0006 gramme) per month of patient's life.

Concetti⁴¹_{No. 28} treated 48 cases with resorcin, in doses of 3 to 22 grains (0.19 to 1.42 gramme), according to age, and every hour or two, according to the intensity of the disease; in all cases the paroxysms were diminished in number and severity, and in some cases the disease was lessened.

The hydrate of turpentine ($C_{10}H_{16} \cdot 3H_{20}$) has been employed by Manasse¹¹⁸_{No. 28} and many others the past year, with the general verdict in its favor; it is in large, colorless, and odorless crystals, with a slightly aromatic taste, and soluble in hot water. Manasse used it in 41 cases of pertussis; the general result was that after four or five days' employment—dosage varying from 20 to 45 grains (1.30 to 3 grammes) according to age—the attacks lessened; in all cases the accompanying bronchial catarrh improved rapidly and soon disappeared. Dubusquet-Laborderie,³_{Apr. 20} in 300 cases of whooping-cough treated with antipyrin, obtained very good results; indeed, in 197 cases, some of them getting well very rapidly; but the general sentiment of the profession is not now in favor of the employment of this drug. Thomson,⁵¹_{No. 28} gives an account of some cases which he treated with ergot, others with nitric acid, and others with chloral, as follows: 60 cases were treated with nitric acid—the death-rate was a fraction over 23 per cent.; 49 cases were treated with ergot—the death-rate was 16 per cent.; 95 cases were treated with chloral hydrate, with a death-rate of 16 per cent.

In summing up, the author decides that the chloral was of service, in that it mitigates the violence of the paroxysmal cough and diminishes the tendency to convulsions, but has no influence on the number of paroxysms, nor does it shorten the attack. The other two remedies he considers of no service in the treatment of this affection. Purdom²²⁴_{Apr. 12} says that he treated 103 cases with ergot without a death; he believes that it acts by relieving congestion of the vessels about the medulla, by constricting the vessels of the parts invaded by the micro-organisms, and by making the soil less fertile.

Ouabaine has been extensively employed in the treatment of pertussis recently, and Gemmell,²_{Apr. 20} gives his conclusions of its value as the result of the treatment of 49 cases by this agent. Ouabaine is an alkaloid obtained by crystallization from the watery extract of the roots of the *Ouabaïo*. The formula of the alka-

loid is $C_{30}H_{46}O_{12}$. In the first stage of pertussis it cuts short the attack; in the second stage it reduces the violence and frequency of the cough, and in the third stage it hastens convalescence.

Weisgerber⁶⁷_{Apr. 30} records 3 cases of pertussis treated with sulphur-vapor; he uses Deschien's bougie, No. 1, which burns 10 grammes of sulphur an hour, the patient being placed in a room measuring about 18 cubic metres. The treatment is repeated night and morning. The fits of coughing are greatly relieved, after a day or two of treatment, then disappear, after giving place to a cough which occurs once or twice in the twenty-four hours. Fischer⁶⁹_{Sept. 6} has employed bromoform in 16 cases with excellent results; in some cases ten days' treatment was sufficient, in others four weeks were required; about 75 per cent. were discharged cured between two and three weeks. The doses required were as follows: for children under and up to 1 year of age, 2 to 3 drops three times daily; children from 2 to 4 years, 3 to 4 drops three times daily, and children until 8 years, 4 to 6 drops three times daily. The dose was generally increased on the third day by the addition of 1 drop to the original dose; this agent should be given in about a teaspoonful of water.

Neuman¹¹⁶_{July} has treated 25 cases with bromoform and believes that it cut short the course of the disease; it certainly reduced the number of paroxysms. Senator, of Berlin,⁸⁴_{Nov. 28} has tested this remedy in his clinic in 100 cases, and finds that it is of great value. He considers it almost a specific. The good effects were gradually noticeable from the second to the fourth day.

Ree⁶⁸_{Nov. 10} believes that if antipyrin be administered in the convulsive stage it will abort the disease on the third or fourth day. The dose should be $1\frac{1}{2}$ grains (0.10 gramme) for every year of the child's life, given three times daily.

PAROTITIS.

Bordas⁵¹_{Jan.} described before the Société de Biologie what he calls the *Bacillus parotidis*, developed in the blood of a patient with mumps. In certain phases of the development of these bacilli they are S- or V- shaped; when they are divided their ends may become enlarged. The bacillus dies at 60° C. (140° F.) and its spores at 90° C. (194° F.) Bichloride, 1 to 500,000, put into the culture

broth, prevents the development. As a culture made with the saliva was very rich in the micro-organism, the author thinks that it is the real agent of contagion.

There have been only two notable epidemics of mumps reported the past year,—one which occurred in the puerperal wards of the Philadelphia Hospital, ⁷⁸⁰_{July 12} and the other described by Henry ¹⁰⁰_{Jan} as occurring in Harmon, Ill.; in the latter there were more than 100 cases in a not very thickly-settled neighborhood. Testi ⁸_{Dec. 12} relates a case interesting from the fact that a double-sided parotitis followed an attack of pneumonia.

Sequelæ.—Rotch ⁹⁰_{July 21} reports 2 cases of loss of hearing consequent upon attacks of mumps, and believes the lesions in both cases to be in the labyrinth; but the nature of the pathology is somewhat uncertain. Two cases of unilateral deafness were also reported by Moure ⁷⁸⁰_{Jan} following parotitis, in one of which the author believes that there had been an exudation into the tympanic cavity, interfering, thereby, with the action of the fenestræ.

At a meeting of the Société Vaudoise de Médecine, in June, Dufour ²_{Sept. 12} exhibited a drawing of a case of acute inflammation of the lachrymal glands occurring during an epidemic of mumps. Hirschberg also described 2 similar cases which occurred during an epidemic in Berlin last spring.

Jackson, ²_{Mar. 22} during the prevalence of the influenza last year, observed 4 cases of parotitis complicating the disease. F. M. W.

RHEUMATISM AND GOUT.

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ACUTE AND CHRONIC RHEUMATISM.

Etiology.—The medical literature of 1890 presents very little that can be regarded as new concerning the causes of rheumatism. As predisposing causes, writers continue to enumerate inheritance in from 20 to 27 per cent. of all cases; exposure to cold and damp air; overwork, either physical or mental; defective digestion, especially when accompanied by constipation; and Charles H. Shepard⁶¹_{Sept. 20} says that "there is no doubt that tobacco and alcohol are responsible for a large amount of this as well as other diseases. The action of tobacco on the nervous system, which is mistakenly supposed to be a tonic, is, in reality, only a toxic effect; and alcohol, by preventing the elimination of waste material, helps to aggravate every weakness and increase every predisposition to disease." Robert Bell, of Glasgow,⁶_{July 1} says: "By far the larger number of cases met with in practice, however, are induced by that toxic condition arising from long-continued constipation. The vitality of the individual, and therefore of his blood, is thus diminished, and rendered a fitter nidus for the micro-organism which appears to constitute the essence of the disease. In like manner, exposure to cold and wet depresses the vital forces, and may prove to be an exciting cause, but this will probably result in a rheumatic attack only if habitual constipation has previously existed." While Bell thus regards constipation as causing fæcal infection and thereby favoring the development of the micro-organisms, A. Haig⁶_{July 10} concedes the bad effects of constipation, but claims that it favors "the absorption of acid from the large intestine, raises the acidity of the urine, and diminishes the alkalinity of the blood, so that it not only brings about an accumulation of uric acid in the body, but may also account for its precipitation into the joints in acute rheumatism."

Jaccoud,³_{Dec. 1, '90} after citing the fact that Petrone and Mantle have discovered two varieties of microbe in the serum taken from the joints affected with acute rheumatism, as stated in the ANNUAL for 1889 and 1890, says: "The unvarying nature of these observations renders us rather suspicious, as we, too, had searched in the articular and pleural liquids, and often in the more serious cases of primary visceral rheumatism, and have never been able to discover a single microbe." Per contra, F. Bordas,³¹_{May 2} pursuing biological investigations under the direction of G. Sée, examined 6 cases of acute rheumatism, in only 2 of which did he succeed in obtaining microbe cultures. The microbe he describes as a bacillus, which was cultivated readily in peptone gelatin in tubes and on plates, and still more rapidly in veal-broth. The broth culture, injected in two instances, was followed by a moderate rise in temperature, and injected into the carotid artery of a rabbit was followed by endocarditis with vegetations upon the valves.

Houze⁴⁵⁴_{June} reports an interesting case of a soldier who had an attack coincidently of acute articular rheumatism, pneumonia, and erysipelas, all regarded by many as infectious diseases, caused by pathogenic microbes. But the reporter properly suggests that the microbe of Friedländer supposed to cause pneumonia, that of Fehleisen in erysipelas, and those isolated by Petrone, Mantle, and Bordas in rheumatism, are essentially different from each other, and would necessitate the conclusion that the three specific pathogenic microbes were displaying their active influence simultaneously in the same patient.

Concerning the specific cause of gonorrhœal rheumatism, a leading article⁸⁰_{Oct.} says: "Barlow's view of the pathogeny of gonorrhœal rheumatism has been strikingly confirmed by subsequent investigators. According to Gerster, this form of urethritis is due rather to the absorption and presence of simple pyogenic organisms than of gonococci. He regards it as certain that pus-generating organisms play an important part in gonorrhœic and non-gonorrhœic urethritis, and that the metastatic processes complicating urethral inflammations are mostly chargeable to their presence and not to the presence of gonococci." Robert T. Morris⁶⁶³_{Feb.} also says: "The complication of gonorrhœal rheumatism will follow in the wake of many a simple urethritis in which gonococci have never proliferated."

Pathology and Pathological Anatomy.—While A. Haig continues to accumulate clinical and experimental facts in favor of his view, that acute and subacute rheumatism are inflammatory processes caused by the presence of an excess of uric acid precipitated from the blood, the larger number of writers during the past year regard them as infectious, as indicated by the quotations just made from Bell, Jaccoud, Bordas, Houze, Gerster, and Morris. In the same direction, A. Ollivier, of Paris, ²⁰²_{Jan. 2} in speaking of scarlatinal rheumatisms, says: "Without stopping to consider the older theories, I will state one which has been ably supported by Jaccoud. According to his view, the arthritis of scarlatina, as well as the endocarditis, the pericarditis, the pleurisy, etc., which sometimes accompany this disease, are but the manifestations of the exanthem on the serous membranes in general." And, he adds, it is likely that these fluxions to the serous membranes are due to the irritation determined by the micro-organisms which penetrate, by means of the blood, to these shut sacs, their number being in the ratio of the intensity of the disease. And yet he acknowledges that "it is still impossible to pronounce positively with regard to the pathogenic agent of this disease."

Peter, ⁷⁶⁰_{Jan. 4} in his clinic at the Necker Hospital, speaking of gonorrhœal rheumatism, declared his belief that it "is due entirely to reflex disturbances;" that "the urethral inflammation affects certain centres in the spinal cord and brain, and the altered conditions of these give rise to the changes in the articulations."

Concerning the anatomical changes taking place in structures affected by acute rheumatism, very little has appeared in our periodical literature during the past year. Frank S. Parsons, ⁶¹_{July 12} says: "The post-mortem changes to be found in children with rheumatism differ greatly, according to the severity of the various local affections. The joints are oftentimes so slightly damaged as not to give those marked pathological changes so uniformly present in the adult. The synovial membrane may, however, be hyperæmic, and there is more or less effusion into the joint-cavities and surrounding tissues. This effusion may consist of synovia or serum containing blood-corpuscles or leucocytes. Occasionally minute hæmorrhages in the more vascular portions occur. Rarely is there suppuration or ulceration of the cartilages. In children, commonly, one finds near the joint or tendons fibrous nodules,—a

condition similar to that found on the cardiac valves after rheumatic endocarditis.

Kasouli,⁶ in minutely examining the morbid changes in the various structures of the knee-joint from old age, found them very similar to those found in rheumatoid arthritis, and describes them as follows: "The morbid changes found in the synovial membrane were not marked in the adventitia, and consisted in hyperplasia of the cellular elements and the development of connective tissue in the adventitia, together with thickening of the walls of the capillaries lying beneath the intima synovialis; also in a varicose enlargement of the capillaries, in separation of adipose tissue in the synovial membrane, and in splitting of the adventitia into fibres. In the cartilages the cellular elements were found to be undergoing fatty degeneration, and the interstitial substance to have broken up into fibres and to have become infiltrated with certain saline matters. In the spongy portion of the epiphysis of the femur the trabeculæ had become very thin and cavities had been formed by the absorption of the osseous substance of lamellæ, into which the bone, near the cartilaginous covering, had split up. In the medulla of the bone there was a marked deficiency of medullary elements; the small vessels were affected by a varicose enlargement and their walls were thickened."

C. W. Suckling⁶⁴⁵ relates a case of chronic rheumatic arthritis following an acute attack. The patient was aged 33 years, and had been nine years in the Birmingham Work-house Infirmary. His knees, ankles, elbows, wrists, and some of the smaller articulations were very much enlarged, probably by such structural changes as are described by Kasouli, while the whole system of voluntary muscles had undergone extreme atrophy. Yet he can stand and walk a little, there being no paralysis. A similar case is related⁴⁵² under the head of "Chronic Articular Rheumatism Deformans with Muscular Atrophy." The patient was a girl aged 17 years, the disease having commenced when she was only 8 years old.

The appearance of subcutaneous nodules in connection with rheumatism has been noticed by several writers. William A. Edwards¹¹² reports 2 cases observed in San Diego, California, and in a table adds 5 others. A. D. Birchard²⁵³ relates an interesting case, and collects many more from different writers.

As correctly described by Barlow and Warner, "the nodules may vary in number from one to fifty, and in size from that of a pin's head to the volume of an almond, and are subcutaneous, firm, and elastic, painless, and freely movable. They are not usually attached to the skin, but to the tendons, deep fascia, pericranium, periosteum, etc.; the integument over them is free from heat, redness, and infiltration, although, exceptionally, tenderness on pressure and slight redness may exist over them. . . . They may occur singly or in clusters, and are often symmetrical; they are very rapidly developed in crops or in succession, and last sometimes for a few hours, more frequently from three or four days to four or five months, or even eighteen to thirty months. The original formations may disappear and be succeeded by fresh ones; and sometimes, when no longer perceptible by touch, they may be found post-mortem. . . . These nodosities do not appear to suppurate or ossify, or become infiltrated with urate of soda, and, histologically, they resemble organizing granulative tissue." Abundant clinical observations show an intimate relation between these nodules and rheumatism.

W. Snively,¹⁶¹ in a clinical lecture, describes a remarkable case of chronic arthritis. The patient is a man 48 years of age, a carpenter who had been working in the Consolidated Virginia Mine, Nevada, 2700 feet below the surface, for five years, when his trouble commenced with pain in his feet, and has progressed in a chronic form for the last nine years. His present condition is described as follows: "His face is almost cadaveric; his emaciation extreme; he is almost a living skeleton. Yet, notwithstanding these evidences of profound disorder of nutrition, I discover no visceral lesion; the heart and arteries are normal; the kidneys are healthy; his bowels act naturally; his respiration is natural; there is no evidence of general or localized paralysis, and his intellect is unimpaired. . . . As he lies before us upon the table, we verify the fact that he is reduced to a condition of almost complete immobility; he can raise his right arm slightly, but the movement is painful at the shoulder; he can flex the fingers and move the thumbs of both hands a little; he can move his head within certain limits from side to side and the inferior maxilla, but that is all." The immobility and emaciation in this case appear to have resulted from a progressive atrophy and induration of the subdermic cellular

and fibrous tissues throughout the body and extremities, while the bones and articulations were but little altered.

The influence of rheumatism as a cause of chorea, as shown in the study of 146 cases of the latter disease by H. W. Syers, ⁶_{Dec. 21, '90} is stated as follows: "Acute rheumatism as a cause, 6.16 per cent.; rheumatic antecedents, not causal, 23.97 per cent.; nervous disturbance as cause, 64.38 per cent.; rheumatic inheritance, 32.19 per cent.; neurotic inheritance, 33.56 per cent.; structural heart disease, 13.69 per cent.; heart affection, other than structural, 43.8 per cent."

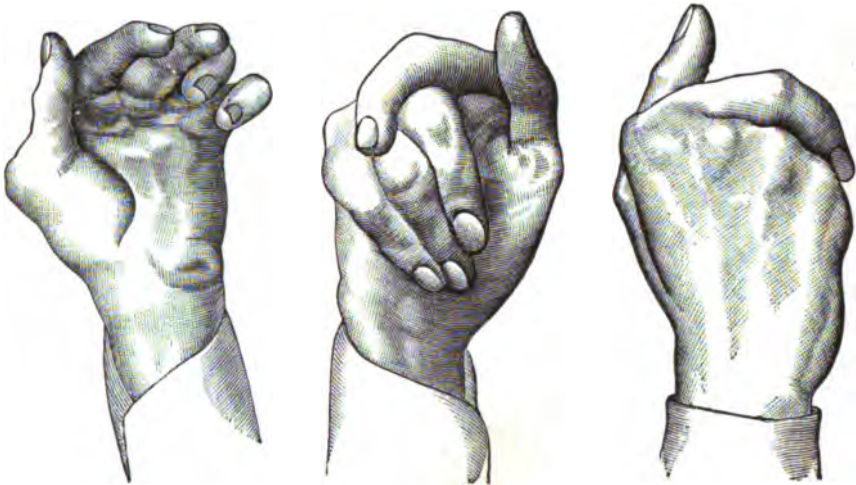
C. J. Rademacher ²²⁴_{Aug. 20} details the processes by which he succeeded in obtaining paralactic acid from the urine passed during the progress of acute rheumatism.

Diagnosis.—Hugh Lane, ⁶_{Oct. 28} in a paper on "Differentiation in Rheumatic Diseases," endeavors to establish a diagnosis between rheumatoid arthritis and rheumatic arthritis. The latter he regards as simple chronic rheumatism unaccompanied by any special diathesis, while the former is generally complicated by a "strumous taint" that modifies the symptoms and necessitates corresponding modifications in treatment. "There will be distinct muscular atrophy in the rheumatoid arthritis case, and the complexion will present the pallor mentioned before, showing, on closer inspection, yellowish tinges on the face, neck, and perhaps elsewhere." In the rheumatic arthritis, he says: "There is frequently a flexion and fixation in phalangeal joints, accompanied by a swelling which ends abruptly above and below each joint, whether in those fixed or not, which is not observable in rheumatoid arthritis; for in the latter the swellings have strong inclinations to be spindle-shaped; that is, graduating into the normal parts."

Fifteen years previously A. P. developed rheumatoid arthritis in several joints of both hands. This went on for two years without much change, and then he had an acute attack of rheumatism, after which the joints gradually assumed the shapes shown on page 7. They illustrate a good example of the typical deformities of a "mixed case."

Treatment.—Much the larger part of what has been written regarding the treatment of acute and subacute rheumatism during the past year relates to the use of the salicin, salicylates, salol, antipyrin, and other recently-constructed remedies. Raphael

Hirsch,⁶⁹ gives an interesting summary of the use of these remedies, including phenacetin, in both acute rheumatism and in complicating neuroses; and V. Calalb,²⁵⁰ occupies several pages with cases illustrating the effects of mercurial ointment applied to the affected and painful articulations. He applies the unguent, covers the surface with gutta-percha, and keeps the parts at rest four days. If the pain has not ceased, he repeats the application, the same as at first. Eight cases are reported, with excellent results. Slight salivation occurred in only 1 case. Regarding the use of phenacetin, Collischonn⁶⁹ ⁹⁰ claims much greater success in the treatment of acute cases with large doses. He recommends the giving of four



HANDS OF A. P., ADMITTED JANUARY 7, 1889.
(*Lancet*.)

doses per day of 1 gramme (15½ grains) each, or two doses of 2 grammes (31 grains) each, and has observed no ill effects from it. Nearly all the writers who regard acute and subacute rheumatism as infectious or caused by micro-organisms incline to attribute the beneficial effects of all the recently-introduced antirheumatic remedies to their antiseptic properties. On the other hand, A. Haig² ^{Apr. 90} and others, who regard uric, lactic, or other acids as the chief etiological factors, attribute their efficacy to their power to increase the eliminations from the kidneys and the skin, aided by their direct analgesic properties.

W. A. Proctor¹⁷⁶ ^{July} relates 2 cases of subacute rheumatism treated successfully by the use of the following formula:—

- R Benzoate of lithia, . . . 32 grammes (1 ounce 14 grains).
 Tinct. of hyoscyamus, . . . 64 grammes (2 ounces 28 grains).
 Simple syrup, . . . 196 grammes (6 ounces 2 drachms 24 grains).
 M. Sig.: Teaspoonful three times a day, before meals.

Aulde¹⁷⁶ recommends the tincture of the *Rhus toxicodendron*, prepared from the fresh leaves, as a very valuable remedy in the treatment of painful rheumatic affections. The dose is $\frac{1}{2}$ drop in sweetened water three times a day.

Gonorrhœal rheumatism and its treatment has received more attention than usual, as indicated by the number of articles in the medical journals. Rifat⁶⁷ reports 3 aggravated cases treated successfully with 1-gramme ($15\frac{1}{2}$ grains) doses of phenacetin, given at first three times, but gradually increased to six and eight times per day, aided by compression of the swollen joints. A majority of writers still recommend the internal use of iodide of potassium with local compression, and, when there is considerable effusion into the joints, aspiration. Schüller,³ in addition to the foregoing, recommends the application of mercurial ointment in the more chronic cases. Robert T. Morris,⁶⁰³ whom we have already quoted as attributing this form of disease to pyogenic infection from strictures and suppurating processes in the urethra, declares a removal of the strictures and morbid conditions of the urethra to be the only prompt and effectual remedy for the rheumatic affection. Peter, who regards the disease one of reflex action, claims great success in its treatment by direct local measures, namely, rest and immobility, with vesication or thermo-cautery points in the early stage, and then massage until the function of the articulations is restored. He regards all internal medication as useless unless there is a complication of syphilis.

The treatment of chronic rheumatism has also received a fair share of attention. Carl Hochhalt³⁵⁷ recommends the use of pilocarpine in those chronic cases accompanied by serous effusions and moderate contractions from alteration of the fibrous tissues. He advises the hypodermic injection of 0.01 to 0.03 gramme ($\frac{1}{8}$ to $\frac{1}{2}$ grain) pilocarpine muriate at such intervals as the patient will bear. The copious sweating and flow of saliva are supposed to promote a rapid absorption of the serous effusion and hasten the removal of the plastic exudates. The same remedy had been recommended by Coloman Korda ten years since.

Hans Frœlich, ⁶⁶⁸_{Nov.} alluding to cases of stiffening and deformities from fibrinous deposits, and adhesions in the bursal sacs, sheaths of tendons, etc., says "the basis of the treatment is the mechanical removal of the deposits and obstructions of the lymph-canals by anatomical scientific massage, passive motions, and Swedish gymnastics," continued, if necessary, many months.

Charles H. Shepard, ⁶¹_{Sept. 30} relates 4 cases of subacute and 2 of chronic rheumatism treated with prompt success by Turkish baths, and strongly recommends the remedy in connection with proper regulation of diet.

GOUT.

Etiology.—Guyon and Dieulafoy ¹⁷_{Feb. 11} give an interesting clinical discussion of the principal manifestations of gout and its pathological coincidences and identities with chronic rheumatism, and Montagnon ²²⁸_{July 15} reports a case of acute gout with hyperpyrexia; but neither present anything of importance regarding the causes of the gout.

Indeed, the only new or additional item relating to the special exciting causes of this disease that has appeared is in an interesting paper by C. J. Rademacher, ²²⁴_{June 21}. He says: "Persons suffering with gout, acute or chronic, have almost an immediate precipitation in the urine after passing it. If this precipitate is examined chemically, it will be found to differ from uric acid in its ultimate composition. This acid is only found in the urine during an attack of gout, and always in a free or uncombined state, while the uric acid remains in the urine as a urate and in solution." To this acid, and not to uric acid, he contends that the attack of gout is due. Rademacher describes the process by which he obtains this acid and its composition as follows: "The precipitate in the urine was collected in a filter and washed with distilled water. It was then transferred to a beaker and neutralized with a dilute solution of caustic soda, and filtered through animal charcoal. The filtrate was treated with pure dilute hydrochloric acid, the precipitated acid again washed with distilled water, redissolved in a solution of caustic soda, and again precipitated with pure dilute hydrochloric acid, washed, and dried. This acid, prepared by the above process, is a white crystalline powder but sparingly soluble in water. Its aqueous solution has a decided acid reaction to litmus (which uric acid has not); its formula, from an ultimate analysis, is

$C_6H_8O_4N_4$, its molecular weight 200, and it contains 28.28 per cent. of nitrogen." As this acid is only sparingly soluble in warm water, and consequently easily precipitated into the tissues from the blood, Rademacher attributes both the local inflammations and fever of gout to such precipitation.

Pathology and Pathological Changes.—Sir William Roberts,⁶ relates some interesting experiments relating to the reliability of Emil Pfeiffer's method of recognizing the gouty state and the kindred state of urolithiasis by an examination of the urine even when there were none of the usual symptoms of those disorders present.

Pfeiffer's method was originally communicated to the Seventh Congress of German Physicians, at Wiesbaden, 1888, and was subsequently reviewed and sustained by Schetelig, of Hamburg. The method consisted in taking the urine passed during the twenty-four hours, filtering it through paper, and dividing it into two parts. One of the parts was passed through a filter on which some chemically pure uric acid had been placed. The other part was not so treated. Then 100 c.cm. ($3\frac{1}{4}$ fluidounces) of each were taken in separate vessels and acidulated with strong hydrochloric acid, and allowed to rest until the precipitated uric acid had fully separated. The two precipitates were then collected on weighed filters, washed with distilled water, dried, and weighed. Pfeiffer and Schetelig claimed that if the urine had been passed by a person not affected with gout or urolithæmia, the two filters containing the dried results would show the same amount of uric acid; but, if passed by a person affected by either of these morbid conditions, the specimen that had been passed through the filter containing pure uric acid would show a notable increase of the dried product. This result, if uniform, would form a valuable and easy means of diagnosis in many cases otherwise obscure.

Sir William Roberts, however, repeated these experiments, and varied them by repeating the filtrations, by which it appeared to be clearly demonstrated that the method of Pfeiffer was entirely unreliable as a means of diagnosis. In a paper on the "Chemistry of Gout," read to the Royal Medical and Chirurgical Society, Sir William Roberts,² after referring to the fact that he had shown, in a previous paper, the physiological state of uric acid in the blood to be in the form of quadrates, proceeds to explain the changes

this substance undergoes in the development of an attack of gout. He says: "In the normal state the uric acid which circulated in the blood as quadrurate was at once removed unchanged by the kidneys. But in the gouty state, either from defective kidney action or some other cause, the quadrurate lingered unduly in the blood. The detained quadrurate, circulating in a medium which is rich in sodium carbonate, was gradually transformed into sodium biurate, which was almost insoluble in blood-serum, and was, probably for that reason, difficult of removal by the kidneys. Under these new conditions sodium biurate accumulated more and more in the blood, and, when the accumulation had reached a certain point, was precipitated in the crystalline form in the joints and elsewhere, thereby determining the occurrence of a fit of the gout." These changes he had demonstrated by a careful study of the behavior of the quadrurates in the blood-serum, in synovial fluid, and in a solution of sodium chloride, 0.5, with sodium carbonate, 0.2, in water. "Uric acid was taken up freely by these media as a quadrurate; but after a certain pause—a few hours or a few days—it was again precipitated, often somewhat suddenly, in the form of crystalline needles of sodium biurate, exactly resembling those found in gouty deposits. This remarkable reaction was held to be analogous to the phenomena of the gouty paroxysm." The greater the amount of quadrurate held in the solution, the more speedy and copious was the precipitate of the biurate. The precipitation took place more readily from the synovia than from the blood-serum, which would explain why the gouty deposits occur most in the joints. In a later communication to the Medical Society of London, Sir William Roberts² proposed giving that stage of gout characterized by deposits of biurate of sodium the name of *uratosi*s, while lithæmia would designate the stage preceding the precipitation or deposit.

Treatment.—Very few suggestions of value have been made in regard to the treatment of gout in any of its stages or forms. C. J. Rademacher²²⁴ says that if there is any such thing as a specific for disease, the combination of colchicia, decandria, and solanin, with iodine, is a specific for gout.

Frank Woodbury¹⁴⁴ says: "In cases of lithæmic pains in the internal organs, I have administered a pill something like the following: Merck's colchicine, $\frac{1}{4}$ grain (0.0027 gramme); quinine

hydrochlorate, 3 grains (0.19 gramme), and morphine hydrochlorate, $\frac{1}{4}$ grain (0.016 gramme), every four or six hours, with marked benefit."

J. Mortimer Granville,⁶ further urges the use of iodine as the remedy that will most readily unite with the sodium of the biurate in the blood and thereby facilitate its elimination, with early relief to the patient. He gives it in the form of tincture or iodoform, di-iodo-hydriodide of caffeine, or hydriodic acid. It should not be given in combination with sodium or potassium. Thomas A. Edison,² recommends the use of electricity for promoting the removal of gouty concretions, and illustrates the same by an interesting case.

DISEASES OF THE KIDNEYS, BLADDER, AND SUPRA-RENAL BODIES.

By ALLEN J. SMITH, M.D.,

PHILADELPHIA.

DISEASES OF THE KIDNEYS.

Physiology of the Kidneys.—From 12 series of experiments, Glum ⁸⁶⁵₁₈₇₁ finds the average quantity of urine voided during twelve day hours to be 911 cubic centimetres (1 quart), and during twelve night hours 661 cubic centimetres (1½ pints), making the ratio of activity 100:72. Based on the specific gravity, after Trapp-Haeser, the elimination of solids for every day hour is 3 grammes (46 grains), and for every night hour 2 grammes (31 grains). The flow of urine increases immediately after sleep—"Quencke's morning urine flow." Short interruptions of sleep in persons who readily fall asleep again after awakening induce no increased flow of urine. During the night, up to morning, the urine voided becomes constantly more concentrated.

Spallitta ⁹⁶⁰₁₈₉₀ has recently carried out a series of experiments, with a view of ascertaining whether the effects produced on the renal secretion by lesions of the medulla oblongata are due, as held by Ustimowitsch, Heidenhain, and Sachs, to the alteration of the blood-pressure caused by the lesion, or, as supposed by Eckhard, to some morbid change in the innervation of the kidney. The cord was cut at different positions, and the urinary secretion examined. In order to make certain that the urine found in the bladder at the necropsy was secreted after the cord had been cut, iodide of potassium was injected under the skin after the operation, and the urine examined for iodine. Lesions of the cord at the base of the first dorsal vertebra produced no changes in the renal secretion. Sections at the seventh cervical and first dorsal vertebræ permit the continuance of the secretion. Sections at the sixth, fifth, or fourth cervical vertebra allow the secretion to continue, but cause the urine to contain a certain amount of albumen. Sections

(L-1)

at the third or fourth cervical vertebra arrest the secretion altogether. Electrical stimuli applied to the cord in the cervical region arrest the secretion entirely. The theory which appears to Spallitta to accord best with these facts is that the effect on the renal secretion of lesions of the cord is mainly due to the destruction of certain special nervous fibrillæ existing in the cord and presiding over the urinary secretion.

BRIGHT'S DISEASE.

Etiology and Pathogeny.—Rattoni,⁵⁷_{Nov. 17, '90} in considering the etiology of renal inflammation, draws a distinct line of difference between acute and chronic disease. The former may exist as a primary affection in a certain sense, but its real position is that it is a secondary trouble, and is due to the influence exerted by certain substances of irritative nature, of various characters, upon the renal structure, vessels as well as epithelium. The chronic form is part of a general vascular disease in the views of this authority. Semmola,⁵⁷_{Jan. 17, '90} a number of years since, called attention to the dyscrasic theory of the origin of the albuminuria in Bright's disease. Recently he presented a paper before the Academy of Medicine of Paris, in which he concluded that the degree of albuminuria is not always in accord with the intensity of the morbid renal process. In toxic nephritis produced by agents having no alterative action upon the blood, the maximum of renal lesions and the minimum of albuminuria are found, while in toxic nephritis of mineral origin, in general, a maximum of albuminuria occurs that is due both to renal lesions and a dyscrasic condition. In albuminuria produced by the injection of egg-albumen only a slight epithelial alteration is necessary. It becomes, therefore, a simple phenomenon of depurative elimination. Such albuminuria is the result of a functional effort not physiologically met, in that, physiologically, the albuminoids are destined for the intra-organic needs, and not for elimination. The eliminative processes produce at length secondary renal alterations, which really should be classed with the nephritis of toxic origin, except that in the latter the inflammatory, in the former the degenerative, changes predominate. The albuminuria of Bright's disease (always characterized by great oscillations in the quantity of albumen excreted at different hours of the day, because either of the richness of alimentation in nitrogenous substances or of causes that escape us) should be classed

among hæmatogenous albuminurias, because, for anatomical and clinical reasons, it would be impossible to conceive of such rapid and frequent changes, in a few hours only, in the alteration of the epithelium.

This view of a hæmic alteration preceding the manifest renal lesions in Bright's disease in a causal relation finds objection from Hayem,¹⁰⁰ who objects to the value of Semmola's experiments in injecting egg-albumen, for the reason that this substance finds no definite place in the economy, and is necessarily excreted, as is any useless matter. On the contrary, the injection into the circulation of such fluids as pericardial fluid or hydrocele fluid, both of which are rich in albumen, even if practiced for a long time, produces no albuminuria, and is not followed by any appreciable renal change. Moreover, if Semmola's position, that Bright's disease of the kidneys is due to the irritative effect upon the kidneys of certain albumens which circulate in the blood in a condition unfit for assimilation, is true, the following experiment should have produced definite results: Taking a dog, the urine of which contained an appreciable amount of albumen, Hayem transfused the blood of this animal into a healthy dog's circulation, from which he had withdrawn the greater portion of the normal blood. No albuminuria followed; nor, upon repetition at a later date, was there any greater success; nor, upon examination of the kidneys of the dog receiving the blood from the albuminuric animal, was any anatomical alteration recognizable. Moreover, if the albumen arises in these cases from the albumens ingested, the milk diet, containing the principles of the different albuminoid aliments, should be likewise followed by albuminuria. Hayem does not, from this position, assume that there are no hæmic alterations in Bright's disease, but rather that such alterations are not responsible for the renal changes. The Cutters,¹⁰¹ of New York, evidently look upon Bright's disease in much the same light as does Semmola, the dietary being regarded as usually at fault in the production of the condition.

In the class of toxic substances capable of inducing nephritic attacks, various balsams have long been recognized. Certain recent observations of von Litten and Vamossy having indicated that balsam of Peru is to be included in this list, Bräutigam and Nowac,¹¹⁹ have examined systematically the action of the balsam

on kidneys in 22 cases of different diseases. In no instance did they observe any disturbance of the stomach or bowels, nor any abnormality in the urine passed.

Klemperer, ²⁰_{Dec. 10} from an experimental study upon the effects of bichloride of mercury, gives the following *résumé* of his results: The sublimate taken up in the blood is carried to the kidneys for excretion, and induces inflammatory changes in the epithelial structures of these organs. In cases of acute poisoning, where large amounts of the mercurial have been introduced into the system, if death follow rapidly the most marked change in the kidneys is an intense hyperæmia. If life be preserved for a time, hæmorrhagic foci in the parenchyma and degenerative changes in the epithelium may be noted. The longer the case persists, the more marked are the appearances of a parenchymatous inflammation; the cells take on a necrotic type, and calcareous infiltration is not seldom to be found. In most cases there is to be seen a slight glomerular inflammation, and occasionally some evidence of cell proliferation about the capillaries. In the chronic forms of poisoning the necrotic changes in the epithelium are not at all, or only slightly, present; calcification does not occur, and the inflammatory changes limit themselves almost entirely to the interstitial substance of the organs.

As to the infectious nature of Bright's disease, Lafitte, ¹⁰⁰_{Sept. 10} in an extensive article upon this disease, regards the presence of an infectious cause as probable in certain cases, both of the acute and chronic forms, because (a) the sudden inception of the malady is marked by distinct anginose symptoms, which precede by some hours the œdema, albuminuria, and uræmia; (b) occasionally there seems to be slight epidemics of the disease (one of which he details); (c) a mother affected by Bright's disease occasionally gives birth to a child which from birth shows evidence of the same affection, just as occurs in case of syphilis; (d) finally, in the urine of eclampsia cases in women, Blanc has discovered a bacillus which is capable of giving rise, in animals, to convulsions and a diffuse nephritis. The epidemic of Bright's disease above referred to does not, however, possess any definite evidence of real epidemicity, beyond the occurrence of the disease in 3 cases exposed to the same cause. Besides the existence of this probable specific cause the writer recognizes the influence of the various toxic agents

which are usually mentioned in this connection, as well as cold, pregnancy, and the usual infectious diseases. Among predisposing causes this author places alcoholism in a prominent place. Fiessinger⁵⁵ Sept. 27 records that, in several small villages in France, what had the appearance of an epidemic of Bright's disease occurred during the past year. In the hamlet of Geovresset, containing about 100 citizens, 4 cases—3 women, aged respectively 48, 42, and 52 years, and a man aged 56 years—were successively taken ill, presenting, more or less, well-marked uræmic symptoms. In Martignat, a village of about 550 inhabitants, 14 cases were attacked at nearly the same time. These two villages were situated not very far from each other. The grippe did not make its appearance in this vicinity until some weeks after these apparent epidemics were over; there was no distinct case of scarlatina present to account for the occurrence. In 1 case the spleen was distinctly enlarged; in another of the 18 cases there was a suppurative parotiditis. This observation of Fiessinger is of considerable interest, but simply in the line of suggestion, no exact methods of infection research having been adopted.

Hopkins⁷⁷ Apr. describes a renal inflammation characterized by the presence of micro-organisms, which present themselves as rods and spores (cocci), the former 3 micro-millimetres in length, sometimes bearing a sporangium. The coccous form, which he looks upon as a different form of the same organism, in that he was able, by cultures, to transform the round into the rod form, measures from 0.4 to 1.27 micro-millimetres in diameter. These micro-organisms he finds in the blood, whence they are carried into the capillaries of the various tissues. He applies the name "clostridial nephritis" to the affection, which he describes as a chronic affection of the kidneys and other organs of the body, due to the presence of *Clostridium renale*, characterized by nervousness, sleeplessness, flatulent dyspepsia, albuminuria, dropsy, dyspnoea, and heart-failure. The occurrence of the germs in the urine, free and in casts, is stated to be its pathognomonic symptom. This description of Hopkins depends, however, upon experiments upon animals from cultures from the urine of a single case not confirmed by either post-mortem or ante-mortem culture experiments from the blood, or any other part of the diseased individual. The variety of bacterium described by him as a clostridium, or at least having the same general

features as his rods, is by no means uncommon in urine, and is usually regarded as belonging with the bacteria of decomposition. Further proof is, at any rate, necessary to establish the validity of Hopkins' claim.

Coats²¹³_{Feb.} describes the appearance of the kidneys of a ram, the organs having been sent him for examination because of the symptoms of the animal, which in a number of ways resembled those of acute nephritis. Throughout these organs the capsules of Bowman were literally crowded with small cocci in chains, and to a less degree the convoluted tubules. Both organs were affected. Coats is disposed to look upon these micro-organisms as entering the renal structure by the blood-channels, and to have escaped from the blood in the renal tufts; this was not, however, established, in that only the kidneys were presented for examination. Two cases of Bright's disease are reported by Matignon⁷⁰_{June 22} and Mills⁵⁸_{Nov. 20, '99} as occurring with purpura hæmorrhagica, in both of which the purpuric phenomena preceded the indications of renal complication. In both of these cases the termination was favorable, and the authors are unable to indicate precisely the pathogeny of the kidney affection. That it was due to the action of either some deleterious substance developed in the course of the hæmatic disease or some special bacteria, is probable; but beyond this in neither case was there opportunity to decide. Albarran, in an exhaustive study,⁴⁹⁴_{Jan. 15, '01} goes over his position stated in last year's issue of the ANNUAL, to the effect that the kidneys have an eliminative power over bacteria, during which elimination the micro-organisms may excite inflammatory changes of more or less grave consequence, possibly with the development of hæmorrhagic and suppurative manifestations. Among the micro-organisms to which he attributes these renal phenomena are the various pyogenic cocci, especially the streptococcus pyogenes and the staphylococcus aureus, and the bacteria of the infectious fevers. As stated, he looks upon the route of invasion as that due to efforts at elimination, the bacteria being brought into the renal area by the blood.

Orth,⁶⁰_{Oct. 25} after going over the work of Wissokowitsch as to the elimination of bacteria through the kidneys, believes it possible that, at least in small quantities, this separation may take place through the capillary tufts without appreciable change; but where

the escape of the micro-organisms is into the perivascular tissues or lymph spaces, and not into the urinary tract, or where in the urinary tract they block up the tubules, there is grave danger of the action of the bacteria upon the tissues.

Ballone,⁸⁴_{Dec. 22, '90} probably as well as any, has outlined the position of the modern schools as to the etiology of nephritis. In the older works the establishment of a diagnosis of Bright's disease was regarded as an *ultima thule*, beyond which it was as unnecessary as undesirable to go in the study of the individual case. Some years since, Semmola outlined his theory of the secondary nature of many of the cases classed under this name, and since then, receiving great impulse from the development of bacteriology, the prime lesion influencing the establishment of renal inflammatory disease has come to be sought, not especially in the kidneys, but in diseases of the blood or other organs of the body, whereby extra function, injurious to the renal structure, has been thrown upon these excretory organs. The position seems entirely tenable, these noxious substances constituted by various active agents or their products, or by various substances developed by altered tissue metabolism in the economy or noxious matters introduced from without. Probably, however, there must be excluded a certain proportion of cases which are to be regarded as primarily renal in their origin. These cases are those where no infectious or toxic influence is recognizable positively, and in which cold and pressure from internal enlargements seem to exert the determining factor. There are those writers who, as Semmola, theoretically explain away even these instances of primary renal origin; but the mass of opinion remains undecided to accept their theories without more positive proof than has thus far been offered. Loos,⁸⁶_{8.4} writing from the pædriatic clinic of von Jaksch, in Gratz, speaks of this last class in children, among whom it constitutes a considerable proportion, so far as influenced by cold. In his conclusions, however, this author refers a certain number of cases to the activity of micro-organisms, some of which may, perhaps, be shown to be specific. Again, another class of those cases, usually described as primary nephritis, he refers to the influence of chemical agencies. Thus, then, according to Loos, our modern bacteriological and toxine studies promise to leave, although this is not yet accomplished, but little room for our older views, that Bright's disease

of the kidney constitutes a *malum per se*, and that its establishment in diagnosis leaves naught to be sought for.

In connection with the subject of etiology in relation to the infectious diseases, scarlatina is mentioned as a cause by Handford, ⁶_{Nov.} in a case of Bright's disease in a girl 12 years of age, who had had measles at 2 and scarlatina, followed by dropsy, at 3 years; and by Barth, ¹⁷_{July 20} in a boy of 15 years, who presented the evidences of an acute nephritis following immediately after an attack of scarlet fever. Variola is accused of having predisposed an attack of acute nephritis which came into the hands of Peter. ¹⁰⁰_{Feb. 4} The patient, a young man of 27 years of age, who had passed through small-pox in 1888, had directly induced the Bright's disease symptoms by exposure to cold immediately before the manifestation of the disease.

Delevyn ⁴⁵⁴_{Oct.} records the case of a soldier who developed first an œdema of the arm after vaccination. Presently, when the œdema of the arm had disappeared, the face began to swell and he complained of pain about the region of the bladder; on the following day anasarca was fully developed. The course of the case was that of an ordinary Bright's disease; the urine contained albumen and casts. Having apparently recovered, suddenly, apparently without cause, there occurred a relapse, the patient passing into a uræmic condition; eventually the case terminated favorably. An interesting case is mentioned by Markley, ⁸⁵⁰_{June} which followed an attack of measles in a female child aged 5 years; under treatment the albuminuria rapidly disappeared, but was followed by a glycosuria, which also yielded readily to medication.

Ashby and Hilton Thompson ²_{Apr. 20} presented specimens of intense parenchymatous nephritis from 2 cases in whom the renal trouble developed after diphtheria. Four cases of acute nephritis following typhoid fever are the basis of a paper by Kompe, ³⁴_{Mar. 18} who concludes from his observations that if not one of the most frequent, at any rate one of the most dangerous sequels of typhoid fever is acute Bright's disease, in that it usually makes its appearance in convalescence, when the resistive power of the individual is exceedingly low; the author believes that there exists some bacillary connection between the two maladies. Lecorché and Talamon ²⁰²_{July 10} detail 3 cases of syphilitic Bright's disease, the kidneys indurated, the vessels showing evidences of syphilitic arteritis and slight

amyloid change. Leroy,³⁸⁰_{Mar.} after discussing the question which has frequently been a bone of contention, whether the renal manifestations of syphilis are not in reality due to the mercurial medication, mentions a case from which the possibility of mere coincidence is apparently eliminated, in which the kidneys were distinctly the seat of vascular changes. Séjournet⁵⁷⁷_{Sept.} calls attention to an infantile nephritis which is frequently seen in badly-fed, poorly-nourished infants, usually varying from 11 to 16 months in age. The particular form seems to be entirely distinct from any real infectious cause, but apparently depends upon the absorption of irritative products of intestinal maldigestion and their elimination through the kidneys. The disease is of more frequent occurrence than might be supposed, but is usually responsive to treatment by removal of the source of irritation. It is a well-known fact that in the endarterium of chlorotic subjects there are frequently met patches of degenerative changes, as well as the evidences of reaction on the part of the tissue in numerous sclerotic bands about these areas. These changes are not only seen in the aorta, which is apt to show most markedly the changes mentioned, but in the smaller vessels as well, as in the kidney. In the latter organ these sclerotic changes lead naturally to a form of contracted kidney with insufficient functional power. Exactly how these arterial sclerotic and degenerative changes are developed may not at present be positively stated, but there is a probability that they are caused either because of lack of nutrition to the endarterium or because of some change of an irritative nature in the blood of the chlorotic. The records of cases of this form constitute a paper published by Pilliet.¹⁶⁴_{Aug. 21} Hays,²⁸⁰_{Nov. 25} in considering a similar case, calls to our attention, in explanation of the phenomena, the theory of Virchow of increased blood-pressure in these cases, due to the presence of a nearly normal bulk of blood in a distinctly contracted circulation, and the altered condition of the blood. He, moreover, recognizes the existence of a third factor in permitting the establishment of an albuminuria, the vascular alterations in the kidney which he looks upon as degenerative in character.

Willey⁶_{Dec. 21, '78} analyzes 27 cases of albuminuria following scarlet fever, and divides them from clinical aspect into three groups, in the first of which he believes the symptom to be due to nervous and vascular causes; in the second to even more general causes,

inasmuch as there occurs a general collapse during the process of dying or some curious phenomena, probably due to vasomotor changes; and in the third group to renal inflammatory causes. In the first group, which is much the largest, the albumen begins suddenly and in large quantity, but is no sooner begun than it commences to diminish. The symptom manifested itself from the thirteenth to the seventeenth day. The second group does not have any fixed time for appearance, varies but little during the course from beginning to the end, and seems to bear distinct relations to the general nervous and vascular condition of the patient. In the third group, where the albuminuria is dependent, in the writer's opinion, to renal inflammation, the albumen begins as a trace and steadily increases. In the first group the tendency is for recovery; in the second it is apt to be an evidence of failing vitality; in the third the prognosis depends upon the amount and the efficacy of treatment of the renal condition.

Sorel,²⁸⁰ details a case in which there occurred at regular intervals a hæmaturia of brief duration, which had started during his presence in a swampy country, but which was without any febrile manifestations. Treatment by means of quinine, however, succeeded in bringing about a cure, and the writer looks upon the case as one of intermittent renal congestion due to malaria.

As a valuable contribution to the study of remote causes of Bright's disease, or such as possess importance in their relations to the disease already established, is the paper of Purdy¹ upon the influence of climate upon Bright's disease, based upon the tenth census of the United States. From these statistical studies the writer concludes that the chief features of climate in the United States which most strongly tend to increase the death-rate in Bright's disease are cold, moisture, and changeability of temperature; while the elements of climate tending to decrease the same are warmth, dryness, and equability. The influence of cold is most marked when associated with moisture; but humidity, if accompanied by warmth and equability, has but little deleterious influence upon the course of the disease. The most unfavorable localities for residence for patients with Bright's disease are comprised within the Atlantic coast region and northeastern hills, which include the States of New Jersey, New York, Connecticut,

Massachusetts, New Hampshire, and Vermont. The most favorable localities are included in the southern interior, especially the States of Tennessee, Georgia, North Carolina, Arkansas, and Texas. Race, too, apparently, has considerable importance, the death-rate among negroes from Bright's disease being comparatively low, while among the Irish it is considerably above the average; at least, in this country.

Symptomatology.—Beugnies-Corbeau⁵⁵ looks upon the density of the urine as one of the most important features in urinary examination in diseases of the kidney. The elimination of total solids expresses even better than that of albumen alone the general waste in disease, and thus far is an exceedingly valuable factor in deciding the general course of the case so far as the systemic changes are concerned. Upon the clinical value of albuminuria, Buckley²⁸⁴ reviews the various conditions in which this phenomenon obtains the so-called "physiological" occurrence, the albuminuria arising from local inflammatory changes elsewhere in the urinary tract than in the kidneys, the albuminuria of pregnancy, and other manifestations of the symptom. He looks upon the occurrence of albumen in the urine as a symptom of far less significance, so far as the kidneys are concerned, than the profession at large has been accustomed to regard it, and urges the necessity of carefully eliminating all other possible sources of its occurrence before accepting it as evidence of renal fault. Dujardin-Beaumetz,¹⁴ in a clinical lecture upon this disease, cautions his hearers not to lay too much stress upon the amount of albumen in the urine of their cases, but rather to devote their attention to the proportion of solid materials and the presence of toxins contained in the specimen. From the various remarks which are included in many of the references of the year the value of albumen in the urine as a symptom may be stated in somewhat the following outline: Albumen may possibly be an evidence only of functional disturbance in the body, perhaps not in the kidneys, although the renal function cannot in such instances be declared intact. Albumen may arise from structural changes involving constitutional alteration of the blood, without distinctly affirming disease of the kidneys. Albuminuria may or may not be present when structural changes of the kidney exist, although in the great proportion of cases its presence is a constant feature. Albumen in the urine is very frequently found

as the result of inflammatory changes in the lower urinary passages. Albumen of rapidly changing amount can scarcely be referred entirely to anatomical alterations of the urinary organs; and where the determining lesion is a renal inflammation, the usual severity of the inflammatory process cannot be blamed for a large percentage amount of albumen. Where renal inflammatory changes are accompanied by high degrees of albuminuria, a small proportion of the albumen may be referred to the inflammation for its origin; but the bulk probably owes its origin to functional faults of the kidney depending on the inflammation, and upon hæmatic constitutional alteration following or preceding the nephritis. Billaux, ²²⁰_{Dec. 20, '99} after a narration of 7 cases of Bright's disease in which albuminuria was absent or infrequent, concludes that albuminuria in chronic nephritis is only a symptom, and may (like every other symptom) be constantly or temporarily absent. According to this author it is frequently absent in uræmic attacks. He regards gastric and duodenal ulcers as often but the expression of an arterio-capillary fibrosis existing with the Bright's disease, and insists upon the necessity, in cases of alimentary hæmorrhages, of inquiring for the existence of renal lesions. Similar evidence is borne by Mesnard, ³⁶⁸_{Mar. 9} who believes it necessary to often establish a diagnosis of nephritis even in the absence of albuminuria, and conversely often to withhold it where the symptom is present, and narrates the history of several cases confirming his views. Sehrwald, ⁶⁰_{June 12} says that occasionally cases present themselves in which the urine, rich in albumen, contains no casts, although the other usual signs of Bright's disease are not wanting. If the urine is examined in separate portions or each hour, it will be found that the different parts will vary in the number of contained casts. Sehrwald believes that the explanation of this occasional failure is that the casts have been destroyed by the pepsin contained in the urine, it exerting its proteolytic action in the acid urine. The proportion of pepsin is always greater in the urine containing the less number of casts. The longer the urine is kept in the bladder, or in a sufficiently warm atmosphere, the more rapidly does this digestive process go on.

Pole ¹⁰⁴_{Nov. 15} remarks the insidious nature of renal cirrhosis, and lays stress upon the importance of such symptoms as headache of a migraine character, arterial tension with left hypertrophy of

the heart, associated with a urine of low gravity and containing albumen.

In a case of interstitial nephritis of advanced degree, Farnham⁹⁹_{Dec. 5, '98} conducted a series of over 200 measurements of the daily excretion from the kidneys and of its specific gravity. The average daily flow of urine was 1654.9 cubic centimetres ($3\frac{1}{2}$ pints), the largest amount in any twenty-four hours being 2866 cubic centimetres (3 quarts), the smallest 684 cubic centimetres ($1\frac{1}{2}$ pints); the lowest specific gravity reached on any day was 1005, the highest 1018. Chartier¹¹⁸⁶_{7th Aug.}²⁸⁷_{Sept.} describes, as eruptions more or less frequent in connection with Bright's disease, pruritus, urticaria, purpura, bullæ, and particularly a roseolous rash which he considers as most characteristic of the uræmic condition. He adds several cases, one minutely described, illustrating the erythema mentioned. Duclos³⁵_{July 19}⁶¹ says that hæmoptysis in adults, without cardio-pulmonary lesion, is an early symptom of interstitial nephritis. These patients are often affected with rheumatism, eczema, asthenia, and later they present signs of arterial sclerosis. Two cases are described in which the sclerosis gave its first evidence of presence by hæmoptysis, but later was followed by fatal termination because of the renal involvement. Among the symptoms which present themselves more or less regularly, in the course of chronic nephritis, epistaxis has been long recognized, occurring either in the early or later stages of the disease. Several cases serve as a text for an article upon this phenomena by Barth.⁵⁵_{Sept. 4} The mechanism of the symptom has called forth three views: Where it occurs early in the course of the case it has been regarded by many authors as an expression of heightened blood-tension, due to the cardiac and vascular alterations which aid in the development of the renal disease. Others look upon epistaxis, particularly that witnessed late in the course of the case, as due not so much to fault of the vascular apparatus as to hæmic changes, whereby the blood becomes more ready to transude through the walls of the vessels. Still other writers consider the weakening of the vessel-walls by atheromatous changes so frequently present in chronic Bright's disease as the most important factor in the development of the disease. Barth takes the middle ground in relation to these opinions, recognizing the value of each at this or that period, but believing that, as a rule, not one alone, but perhaps all three

methods are more or less in force together to develop the surface hæmorrhages in this affection. He calls attention to the valuelessness of local hæmostatics in the treatment of this symptom except as a temporary expedient, preferring to correct the general tendency by diet and general medicinal measures.

Under the heading of "Insanity as a Symptom of Bright's Disease," Bennett^{170 Oct. ; 1071 ; 144 Sept.} takes the position that frequently mental alienation is associated in the relation of effect with disease of the kidney, the result probably of uræmic poisoning. She states that, contrary to generally received opinion, affections of the kidney are very common among the insane; that "uræmic poisoning" is one of the most frequent causes of insanity. While these mental manifestations may be varied as different centres are irritated by certain unknown poisons, the most prominent and constant symptom is some form of *mental pain*, which may range from simple depression to the most intense forms of melancholia. The motor centres seem also liable to affection, as evidenced by the restlessness and incessant activity of many cases, less frequently by convulsions and convulsive twitchings, occasionally by choreic movements and cataleptoid states. Raymond^{55 June 21, 56 ; 2 July 5} recently read notes of a case of insanity which he considered to have a relation to Bright's disease. The patient was a woman of 65 years of age. Mental disturbance appeared when she was 60 years old. She was never certain of having accomplished simple duties in daily life, and would return to her house to see if the door was thoroughly shut and the fire was out. After making purchases she would return several times to see if she had paid. She suffered from pain in the region of the kidneys, œdema of the legs, and her urine contained 1.2 grammes (18 grains) albumen to the litre (quart). Under milk diet and iodide of potassium the albumen was reduced and the mental condition improved. If the treatment was suspended the mental disturbance re-appeared. The author attributes the condition to uræmia; to the auto-intoxication which accompanies albuminuria. Other cases than this are cited in the paper, in the author's experience and in that of several other writers. Roulland^{225 Aug.} relates a case of similar nature, occurring in a woman, who imagined she was unable to rise from her bed because, as she imagined, her limbs were broken. She refused nutriment and liquids from fear of poison, but seemed quite tranquil and related

her impressions with calmness. She only complained of her head; there was no elevation of temperature, no marked circulatory symptoms; the urine was scant and colorless. She had been in good general health, emotionable, and some time previously was considerably affected by family grief. For some time she had been compelled to arise during the night to void her urine, had been having occasional attacks of epistaxis, and on examining her urine the writer found a considerable amount of albumen present. Under milk diet the urinary symptoms disappeared, when the mental condition steadily improved until, she being practically herself again, her physician left her. In spite of orders the diet rule was relaxed after a time and the patient rapidly grew worse and became maniacal, from which after some months' treatment she also recovered.

Gross¹⁵⁰ records a case of chronic nephritis, in the course of which there developed Ménière's disease of the labyrinth, probably as the result of hæmorrhage into the labyrinth, apoplectic occurrences being of more or less frequent occurrence in connection with Bright's disease.

Sinclair⁷⁴ records a case of incipient Bright's disease in which the retinal picture enabled a positive diagnosis before the development of albuminuria, after numerous failures to reach a definite conclusion had been made by competent physicians; and within a year a fatal termination with characteristic symptoms justified the diagnosis. The writer looks upon the appearance of the eye-ground as a symptom of exceeding value, probably more constantly true in its significance than any one of the ordinary symptoms. A paper of general character upon the ocular symptoms of Bright's disease is contributed by Alleman,⁶¹ who reviews albuminuric amblyopia, particularly in relation to the albuminuria of pregnancy, retinal detachments, vascular sclerosis, and retinal aneurisms and hæmorrhages. Two exceedingly interesting cases are recorded by Knaggs,⁶ brother and sister, in one of whom the most striking symptom was Cheyne-Stokes respiration; in the other a disturbance of respiration, which, as it increased, developed the Cheyne-Stokes character. The connection between excitement and the aggravation of the Cheyne-Stokes breathing was marked in the brother, a man of 56 years of age, a farmer, in whom the mental effect produced by a thunder-storm seemed to initiate the

irregular breathing, which was the forerunner of this symptom. The onset was sudden, and subsequent to this the breathing was made worse when the patient became excited or worried. Sleep always had a beneficial effect, and within a few days, under the influence of sleep induced by paraldehyde, the irregular breathing changed to a natural character. Later, when the final stages of his illness were present, when the uræmic symptoms again appeared, although the mental condition was tolerably clear until a short time before death, the rhythmically-irregular breathing once more appeared and remained until death. Three and a half months intervened between the two attacks, during which period the patient ate and slept well and transacted in-door business. It is an interesting coincidence that brother and sister should develop a chronic Bright's disease, as was the case here, at nearly the same time, and that so rare a phenomenon should appear in both instances, coming on gradually in each case. A highly nervous and timorous disposition in the sister and the association of the condition in the brother with emotion, the improvement in the latter instance during sleep, and its total disappearance after the first attack, suggest that the phenomenon may occasionally be determined by a neurotic predisposition. West²_{Mar. 4} relates a case of Cheyne-Stokes breathing occurring in the later stages of a case of granular kidney, in which the respiratory symptoms, beginning with ordinary shortness of breath some eighteen months before death, for three months, at intervals of several weeks, possessed the peculiar character known by this name. A number of variations from the usual type of Cheyne-Stokes respiration were noted in this case; for instance, the replacement of the pauses by simple intermissions, the disappearance of the pauses while the rise and fall of the respirations continued. Brush⁹_{May 21} reports a case of chronic Bright's disease in which the kidneys were of the large, white variety, and in which Cheyne-Stokes breathing persisted for three weeks, beginning before coma, but continuing after the abolition of consciousness until death. There was associated in this case petechial eruptions looking somewhat like purpura. The case occurred in an insane patient. Downs⁹_{May 21} reports a case in which Cheyne-Stokes respiration persisted for six days, terminating in recovery. At no time were there any decided mental evidences of uræmia, but the ordinary symptoms of advanced

Bright's disease were prominent. The man walked into the hospital with the respiratory symptom fully developed, and how long it had existed previously is not known.

Bouveret ⁹²_{Mar. 10} describes a sudden pulmonary œdema occurring paroxysmally in the course of chronic Bright's disease, particularly in the interstitial form. It is characterized by a sudden onset, an excessive dyspnœa, with threatening of asphyxia, and a very abundant albuminous expectoration. It occurs in distinct attacks, lasting from several minutes to several days, and terminates either fatally or in complete disappearance of all the prominent symptoms. It is not commonly met with. Bouveret has found but 3 cases in all his records of interstitial nephritis occurring in the last eight years of his hospital and private practice. In addition to its course this form of œdema is especially marked by the suddenness of its onset and termination, the intensity of the dyspnœa, and the sudden appearance of copious, frothy, reddish expectoration containing a large quantity of albumen, which is evidently the serum of the blood that has exuded from the pulmonary vessels and filled the alveoli and bronchial tubules. This copious expectoration is followed by diminution in the amount of urine, which becomes dense and high colored. The cause of the occurrence is not well understood; in 1 of the 2 cases detailed by the writer it seemed to follow overexertions, in the other it apparently arose spontaneously.

The condition of gastric digestion in the course of renal affections has heretofore not been systematically studied, although many cases of nephritis manifest themselves by no other symptoms than those of a dyspepsia. Biernacki ⁵⁰⁹_{Nov. 14}, ⁸⁴⁴_{May 21} has conducted a series of experiments recently upon this line. In each case the same conditions of digestion were offered. He determined the presence of free hydrochloric acid by Günzberg's reagent, the amount of the same by Sjöquist's method, the presence of pepsin by artificial digestion; further, he determined the degree of peptonization, the presence of lactic acid, and the total acidity of the gastric contents. He invariably found distinct diminution of free hydrochloric acid, and frequently total absence. Peptonization, as reckoned by the biuret reaction, varied. Artificial digestion of egg-albumen, with and without the addition of HCl, frequently indicated the absence or diminution of pepsin. Lactic acid was not

found in any but small amounts; so, too, the total acidity of the gastric juice was diminished. These properties of the gastric secretion obtained not only where dyspeptic symptoms were present, but also where there was no or but little evidence of dyspepsia.

In a paper in which he details a number of illustrative cases, Robinson⁶⁵_{Nov.} urges that the most serious attention should be given all cases of persistent dyspepsia, the symptoms of which are not infrequently the most pronounced in chronic renal affections. The writer places the gastric disturbances, which often are present, as in reality the starting-point for the development of "contracted kidneys," from the irritative effect upon the kidneys of products of perverse digestion which circulate in the system and are eliminated by the renal function.

White,²_{Nov. 21} presented before the London Pathological Society typical granular, contracted kidneys from a boy not yet arrived at the age of puberty, probably about 10 years of age. In the discussion Crooke stated that he had once seen such a case in a boy of 9 years, in whom the condition was believed to have been produced in sixty-eight days. It followed scarlet fever, and the case died from uræmia and œdema of the lungs.

Chabrely⁷⁰_{Oct. 15} states that in various degrees senile sclerosis of the kidneys exists in 70 per cent. of old persons; and according to this author, but contrary to the generally admitted opinion, these changes do not remain entirely latent. In 10 per cent. the nephritis manifests itself with sufficient clearness to indicate its presence, but in others the signs are very indistinct, or are perhaps entirely referred to concomitant cardiac affection. The symptoms which mark the senile contracted kidney are in general the same as in the contracted kidney of younger life. Albuminuria is by no means constant, but when it exists it is of considerable value as a diagnostic sign. Besides this the usual symptoms may present themselves, or at least some of them: polyuria, pollakiuria, headache, renal pain, epistaxis and other hæmorrhages, dyspnœa, asthma, ocular disturbances, cardiac hypertrophies, *bruit de galop*, œdema of limbs, Cheyne-Stokes respiration, diarrhœa, etc. The writer remarks the great fatality of pneumonias developing in this condition. Kobler,⁸_{July 10, 17, 24, 25} in a paper upon the renal phenomena of acute intestinal affections, concludes as follows: Cases of cholera

morbus may present quite as severe renal symptoms as cholera Asiatica; and, especially in individual cases, the urinary phenomena are like those of the latter disease. The renal symptoms, albuminuria and cast-formations, are caused by a failure of nutrition of the tubular epithelium on account of the diminished supply of blood to the kidneys. The early appearance of hyaline cylinders leads to the conclusion that these bodies are not formed from conglutination of the tubular cells, nor yet from a secretion from these cells, but from a coagulation of albuminous material separated into the urinary canals, in which a sort of fermentative change, analogous to the fibrin fermentation, occurs at the beginning of the epithelial alterations.

Uræmia.—Landois, ⁶⁹July 17, has published a work, and also a brief article, in which he again states his belief that the symptoms of uræmia depend upon the effects of certain toxic substances, mainly creatin, upon the brain-centres, the convulsive movements depending upon irritation of the motor centres, and those of sensibility and sensation upon irritation of other localities of the central nervous system. He verifies his opinions by experiments practiced upon dogs and upon a monkey, by which he succeeded in inducing characteristic motor phenomena by sprinkling over the exposed motor areas of the animal's brains a small amount of creatin. Lancereaux, ¹⁷July 24, 30, in a lecture reported by Lafitte, considers in review the anatomical and chemical theories of the pathogenesis of uræmia. Among the first, that of Traube, that of cerebral œdema, was for a long time in vogue, in which the altered constitution of the blood was believed to induce primarily an œdema of the brain, in consequence of which a secondary cerebral anæmia was induced, whence the symptoms of coma, etc. This theory found strong support from such writers as Rosenstein and Jaccoud. Among other anatomical views as to the production of uræmia were the theory of Graves, who believed it to be due to cerebral congestion, and that of Osborne, who looked upon the phenomena of uræmia to be due to meningitis. These anatomical views seem to Lancereaux to be open to a number of objections. Among the chemical theories, that of the action of urea retained in the blood was regarded as the most justifiable, and was held by Bright, Gregory, and a number of other authorities.

Experimental work, however, at the hands of Feltz and

Ritter and other investigators, and clinical evidence from such authorities as Mosler, Schottin, and others, disproved the causal power of urea in the origin of uræmic phenomena. Frerichs believed that urea may be broken up in the blood into carbonate of ammonia, and this latter substance he regards as the offending substance.

Feltz and Ritter have declared that the salts of potassium are the responsible agents. Finally, and, to the view of the writer, best, a number of investigators have come to the conclusion that in uræmia the blood contains a number of organic toxins whose elimination the kidneys have failed to accomplish, and whose action upon the central nervous system, particularly the medulla, is sufficient to induce the varied phenomena of uræmia. Lancer-eaux divides the condition into two main varieties, gastro-intestinal and cerebro-spinal. These toxic substances, failing of elimination by the kidneys, are, to a certain extent, gotten rid of through the alimentary canal; and in their expulsion induce the phenomena of the gastro-intestinal form, vomiting, purging, etc. If, however, they remain in the circulation, eventually they indicate their presence by acting upon the nervous centres and, by irritation or paralysis, induce the well-known symptoms. The indications for treatment, according to this writer, differ with the variety dealt with. In the gastro-intestinal form he recommends the use of agents to aid in the riddance of the irritative matters, and counsels that opiates be withheld lest the cerebral form be induced. In either case one of the prime measures is the neutralization of the toxins, which, he believes, may be best accomplished by oxygen inhalations. Further, the elimination is to be aided by every means,—stimulation of the dermal, renal, and other excluding functions. A case of uræmia with fatal termination has furnished Jaccoud¹⁰⁰_{Sept. 4} a text for the ventilation of his view of the œdema of the brain being the causal agency. He refers the cause of death to a ventricular hydro-encephalus. Leiblinger⁸_{Dec. 14, 21, '90} calls another factor into account in the toxæmic comas, uræmic, diabetic, and others, in that he believes that the condition of the heart's action must be taken into account. Where the cardiac contraction is kept up longer than normally, and where in consequence the diastolic period is briefer and quicker, he thinks that the time for the aëration of the blood in the lungs is distinctly and pathologically

diminished, preventing the oxidation of the materials derived from the metabolic processes in the system.

Barie,¹⁰⁰ calls attention to a uræmic phenomena in the form of a stomatitis, for which he proposes the name "uræmic stomatitis." Its manifestations are to be seen upon the tongue, gums, lips, inner surface of the cheeks, isthmus, and pharynx. It presents itself in softened patches over the mucous membrane, or as softened and erythematous areas, or as ulcers. These changes are probably due to efforts on the part of the mucous surface to eliminate certain substances. The softened, pultaceous forms are apt to precede the ulcerous, which is the only one of any severity in itself, being accompanied by excessive salivation, fetid breath, and great difficulty in mastication, and being usually met with in conditions of grave general adynamia. Any pathological state of the oral mucous membrane, chronic irritation from tobacco, bad state of dentition, gingivitis, etc., all dispose to the easy appearance of the symptom. For the treatment Barie recommends, as local measures, touching the ulcers with salicylated glycerin, or a solution of chloride of lime, or lemon-juice and the stick of nitrate of silver—combined, of course, with general measures for the uræmic state. Piaseski²⁶⁰ Apr. 1 details a case illustrative of the above observations of Barie.

Westphal^{4, 15} Nov. 22; Oct. records a fatal case of uræmia occurring in an apparently healthy young man of 24 years of age. He had never been strong, but had never evinced any symptoms pointing to renal disease. He was suddenly seized with difficulty of breathing, swelling of ankles and feet, palpitation, left-sided headache; the urine showed traces of albumen and a few hyaline casts and leucocytes. His previous history was good on all points relating to renal trouble. Within a week, after some improvement in the above symptoms, he became aphasic, and in a short time developed convulsions and coma, in which he died. The left kidney had the usual appearances of granular kidney; the right was displaced downward, lying opposite the fourth and fifth lumbar vertebræ, and appeared as a grayish-red, fibrous mass, with the vessels small and not thickened. From these and the microscopic character the condition was looked on as congenital.

A case of sudden coma is reported from the Montreal General Hospital²⁸² Nov. in a young woman, whose urine was found loaded with albumen, whose temperature was somewhat elevated, pulse weak,

pupils equal throughout and reacting to light, with occasional convulsions of a rather toxic character and constipated bowels. No autopsy was performed, but on account of a row of enlarged glands in the neck the case was looked on as one of tubercular meningitis. Beckwith,¹⁸⁶ Picot,⁷⁰ and Beugnies-Corbeau⁶⁶³ relate cases of uræmia, the former marked by coma following renal symptoms, which dated about nine months previously in an attack of the epidemic influenza; the latter records the case of a man who had for some months been complaining of rheumatoid pains and had had frequent attacks of epistaxis. These rheumatoid pains the writer had mistaken for real rheumatism; but after a careful study of the case, confirmed by the establishment of nephritis from the urinary appearances, he relegates them to a uræmic origin. Carr,⁶ has met a case of uræmic convulsions occurring in a child during the course of an acute nephritis, which, while not distinctly connected with a known infectious cause, was generally of the type of scarlatinal nephritis. In this case, as of interest in connection with the teachings of Lépine, hyperpyrexia was a prominent feature. Following the injection of pilocarpine the symptoms rapidly abated and the patient eventually recovered. In the paper of Beugnies-Corbeau, above mentioned, there occurs also a reference to a case of uræmic convulsions of tetanic type, in which the temperature was elevated. Huchard,² has met 10 cases of albuminuria in morphinomaniacs, ending in uræmia. The morphia, by lowering blood-tension, is believed by the writer to induce these renal disturbances.

Strickland⁴³ extolls the value of morphia in the convulsive seizures of uræmia, detailing a case in a young girl in whom he was able to control the attacks by means of small hypodermatic doses of this drug, with an eventual favorable result. Bowles⁵⁹ reports a case of as favorable termination, in which hypodermatic administration of morphia immediately succeeded in controlling a series of uræmic convulsions. Renault,³ believes that, although the appearance of uræmic symptoms is generally taken as evidence of impermeability of the kidneys, this impermeability is false and is due to a sudden renal œdema. These kidneys probably possess a sufficient number of sound glomeruli to answer all ordinary demands under conditions in which the diet is of the simplest general character. The accumulation in the system of poisonous residues

from ordinary nitrogenous diet gradually clogs the kidneys; the secondary effect is to produce uræmia. Cases from which the uræmia is recovered from the kidneys evidence the possibility of their functions in excreting enormous amounts of urea and other matters for a brief period, far above the usual proportion of solid excretion in normal life. In order to prevent uræmia in cases of chronic nephritis the diet should consist of milk and vegetables, with occasionally eggs and such meat as pork, which does not leave any appreciable toxic residue. The writer, moreover, recommends dry cups over the triangle of Petit several times daily, and, if symptoms threaten, leeches. Renault states that the veins of the kidney beneath the capsule communicate not only with the larger vessels of the organ, but also with those of the surrounding mass of fat, and through these with the subcutaneous and cutaneous vessels of the triangle of Petit. In case of the occurrence of the uræmic attack, he advises the direct depletion of the kidney, which is for the time choked up by the œdema; copious draughts of milk and pure water are to be given as diuretics, and enemas of water should also be given every hour or two. Finally, he advises free inhalation of oxygen for the purpose of neutralizing the toxic matters in the blood.

Pathology.—The classification of Bright's disease offered by Delafield finds acceptance at the hands of French,⁵⁸ who prefers it as more full and complete than the older classification of Johnston. He refers to 3 cases, belonging to the chronic parenchymatous, acute, and chronic diffuse varieties of Delafield. An unnamed writer²⁰² states his belief in the unity of Bright's disease, which, in his view, begins as a glomerulo-nephritis invariably, and extends into the tubules or into the connective tissue, which last, in chronic cases, is always more or less involved. From histological examinations of over 60 cases of acute nephritis, Crooke² states that, while in all cases there are present some interstitial changes, he is disposed to retain the name "parenchymatous nephritis" for those cases where parenchymatous changes predominate. He subscribes to Cohnheim's classical dictum that glomerular changes alone may be responsible for the cardinal symptoms of Bright's disease; and in a few of his cases the glomerular changes were so prominent and extensive that the nephritis merited the title of acute glomerular nephritis. Those cases where

the parenchyma, the stroma, and the vascular apparatus are almost equally affected are those to which he applies the term acute diffuse nephritis. Certain cases where the stroma is principally affected by a round-celled infiltration he describes as acute interstitial nephritis. Such cases, he states, occur in connection with scarlatina. As to the large white kidney, the writer states that it develops as a chronic nephritis, usually in connection with diseases of a subfebrile nature, as phthisis and chronic suppurative affections, in which examples amyloid changes are found associated with the parenchymatous. He looks upon these two conditions (amyloid and parenchymatous changes) as not related as cause or effect, but probably both dependent upon the same cause. In the chronic and subacute chronic nephritis cases there are also to be noted glomerular and interstitial changes, and the writer presents regular stages of such changes from the large to the small white, contracted, granular kidney. Examples of a chronic interstitial and glomerular nephritis developing from an acute attack are demonstrated in scarlatina. In a proportion of cases the renal changes are secondary to generalized vascular changes, as in gout and arterio-sclerosis of old age. Here, primarily, the changes are of a proliferative nature, and limited to the blood-vessels and stroma about them; secondarily, degenerative changes affecting the glomeruli and parenchyma of the organ occur. In the chronic parenchymatous form, however, the interstitial and vascular changes are secondary to the kidney disease. These cases are those which stand out from the list which apparently falls under the classification of the single origin, histologically, of nephritis, as a substantive disease of the kidney. As to the vascular and glomerular changes in Bright's disease, in acute disease they are active and proliferative in character, and found in the muscular coat and adventitia of the small arteries and in the glomeruli, and in acute interstitial nephritis, about Bowman's capsule. In the subacute and chronic cases they are found mostly within the capsules, as an exudation compressing the tufts; or in more chronic cases the latter undergo hyaline degeneration and the exudate organizes, leading to the hyaline fibroid or myxomatous degeneration of the glomeruli,—a change which is not degenerative, but productive in character. Marchand,⁴ from examination of microscopic preparations, concludes the origin of the various cellular elements which present

themselves in the microscopic aspect of glomerulo-nephritis to be from the white blood-cells. Orbzut,^{457 844 832}_{p. 421, 70; No. 3; V. 3} from a number of microscopic preparations, concludes that every nephritis takes its origin from the vascular apparatus, and the parenchymatous changes are but secondary. The source of the inflammatory products, from new tissue to cylinders, is in the blood, both white and red corpuscles. The amount and properties of the plasma also exert an influence, giving to the processes more or less activity. The fixed elements of the tissue play only a secondary rôle, according to this observer, and their changes are also to be regarded only as secondary. In a paper upon chronic endarteritis, Meigs urged this condition as the prime fault in a large proportion of Bright's disease, and confirms the views stated by various believers in Gull and Sutton's theory of arterio-capillary fibrosis.²_{June 1}

Crooke and Nason⁶_{Dec. 14, '90} present 3 cases of acute hæmorrhagic nephritis occurring in suppurative meningitis. These cases are peculiar in the hæmorrhagic type, in the diffuse character of the inflammatory changes in all 3 cases, in the fibrinous character of the exudate reminding one of the nature of croupous pneumonia, in the absence of neurotic foci, as indicative of pyæmia and the absence of micro-organisms, and any evidence of previous renal disease. As to the origin of the nephritis, the authors are disposed to attribute it to the combined effect of septic absorption and vasomotor disturbance common to various forms of meningitis. Ralfe⁶_{Dec. 21, '90} contributes to this study 3 cases of acute hæmorrhagic nephritis occurring suddenly in patients suffering from acute myelitis, the explanation of the origin in vasomotor disturbance suiting well certain peculiarities in the symptomatology of these cases, particularly the remarkable increase in diuresis during the onset of the nephritis.

Gaume²¹²_{Apr.} states that in Bright's disease the liver is apt to undergo considerable and rather uniform changes. It is pale in color, somewhat enlarged; the cells are decidedly altered, although there does not seem to be any connective-tissue proliferation. These lesions are not prone to be clinically pronounced. The enlargement is not very marked; but the patient is apt to complain of some pain or fullness or tenderness in the hepatic region. Formad,¹¹²³ in the course of 300 autopsies in cases of Bright's disease, found the heart hypertrophied in 62 per cent., the left

ventricle alone being affected in 34 per cent., both ventricles in 28 per cent. The conditions associated with the greatest degrees of hypertrophy were fatty and contracted kidney, occurring in 29 per cent. of cases of general hypertrophy of both ventricles, and 26 per cent. where the left ventricle alone was hypertrophied; and red granular kidney in 44 per cent. of left and 26 per cent. of symmetrical hypertrophy. The greatest degree of enlargement was found in cases where heart disease was also present, though venous induration was not included. The average weight of the heart was 10 ounces (311 grammes) in acute Bright's disease, 15 ounces (467 grammes) in large white kidney, 14 ounces (435 grammes) in fatty and contracted kidney, and 17 ounces (529 grammes) in red granular kidney. Arterial changes were found only in the red granular kidney. Senile atrophy and amyloid kidney were excluded. A case presenting the clinical features of interstitial nephritis, with left-sided cardiac hypertrophy, evidences of atheromatous and sclerotic change, is the subject of a lecture by Waugh.⁷⁶⁰_{June 14} Hughes⁷⁶⁰_{July 6} reports a case of nephritis associated with mitral stenosis and insufficiency; a similar case is the subject of a clinical lecture by Pepper.⁸²_{Dec. 7, '99} An interesting post-mortem is published by Souques;⁷_{Dec. 13, '99} the subject was a young woman, who died in the course of a Bright's disease persisting from her second pregnancy. The kidneys were large, pale organs, the seat of parenchymatous inflammation; the heart was enlarged, both sides full of clots, and in the right auricle there was a white clot, which had undergone softening in the central parts and was slightly adherent to the auricular walls. This had been the origin of a number of pulmonary emboli; the lungs were studded, each of them, with five or six typical hæmorrhagic infarcts about the size of a walnut.

A case of renal interstitial inflammation with hypertrophied heart and with certain pulmonary signs suspicious of pulmonary apoplexy is reported by Rendu.¹⁰⁰_{Nov. 26, '99} Jaccoud records a case of pulmonary tuberculosis in a young woman, in whom, as the result of the general deterioration, and possibly, also, of the action of deleterious waste products, there had been established a parenchymatous nephritis.

Treatment.—An important discussion upon this subject took prominent place in the proceedings of the Section for Clinical

Medicine at the International Medical Congress in Berlin. The subject was opened by Lépine.³ He noted the fact that many cases of Bright's disease perish prematurely, in consequence of complications, mostly uræmic. The chief indication, then, is to overcome this insufficiency; but care is to be had not to overwork the kidneys in the effort to rid the system of the toxic substances present. The patient must be nourished and the secretion of urine stimulated without irritating the kidneys. To this end the albuminoids in the food must be diminished in relation to the hydrocarbons and fats, since the waste products of these are not excreted by the kidneys. This can the more readily be accomplished, as recent investigations have shown that the supposed necessary daily amount of albumen (80 grammes—2½ ounces) can be still further reduced if the fats and hydrocarbons are simultaneously increased. Meats, therefore, should be given only in very small amounts, and game and similar foods should be forbidden. Although theoretically too rich in albuminoids, milk is the best food for the patient with kidney disease, in that it contains no waste matters, is rich in fats, contains nothing which can irritate the kidney epithelium, and is somewhat diuretic. Added to this, in order to create some variety, digestible vegetables, bread, and farinaceous foods may be given. Eggs, fish, and full-meat diet is to be avoided. Alkaline mineral waters may be necessary to aid in diuresis, but where cardiac weakness accompanies the diminished excretion heart stimulants are indicated. He regards as of highest value for this last purpose crystallized digitalin, which is, however, to be given with great caution, in order to insure its full elimination. Caffeine is sometimes serviceable; strophanthus should not be given, as it has an irritative effect on the kidneys. Iodide of potassium is chiefly indicated when there is arterio-sclerosis. The author is opposed to the use of vapor baths in cases of dropsy, fearing uræmia; but he always advises rest in bed and an equable temperature.

Stewart² spoke particularly of the influence of climate on sufferers from chronic renal troubles. He has seen 2 cases of albuminuria which were caused by residence in malarious districts. As to diet, he is quite in accord with Lépine. He divides the different kinds of diet which he ordinarily prescribes into four classes:—

Diet.	Albumen. Ounces.	Carbohydrates. Ounces.	Fats. Ounces.
1. Ordinary, .	4.665 (145.09 grms.)	10.65 (331.25 grms.)	3.32 (103.26 grms.).
2. Large, .	6.86 (213.36 grms.)	13.07 (406.52 grms.)	4.6 (143.07 grms.).
3. Milk, .	3.2 (99.53 grms)	3.84 (119.44 grms.)	2.96 (92.06 grms.).
4. Low, .	2.494 (77.57 grms.)	16.66 (499.52 grms.)	2.202 (68.48 grms.).

He usually combines the milk with the low diet, obtaining better results thereby, as a rule, than with either separately. The first two diets upon the list are only exceptionally admissible in Bright's disease, as they increase the urea and albumen. By the addition of lime-water the milk can be made more palatable and more digestible. Stewart recognizes no remedy for the affection. In uræmia he recommends pilocarpine and hot-air baths, and when the pulse is very tense nitro-glycerin. Rosenstein, in the discussion of the subject opened by the two previously-mentioned gentlemen before the Berlin Medical Congress, stated that he regards the greatest advance in the treatment of this class of cases is in the direction of hygienic and dietetics. He protested against the use of calomel as a diuretic, inasmuch as the drug is with difficulty excreted by the kidneys. Senator agreed with the previous views as to the inefficiency of drugs; but, while he rejected entirely the routine medicinal management, he believed that in the cases of renal sclerosis iodide of potassium is of service.

This last statement was taken up by Aufrecht, who denied any effect from this substance. Senator¹¹³ regards the prophylactic treatment as the only one of any value. He regards bloodletting as practically valueless, because of the inaccessible position of the kidneys. His plan of treatment seeks the preservation of the renal tubules and the flushing of the organs. For this end he avoids all strong drugs and foods which are readily transformed into albumen. Senator is not entirely in favor of the absolute milk diet, as it is distasteful and disagrees with many patients; but he does not discredit the treatment on this account, as the fluid is "non-irritant and is certainly of great benefit in most cases. He occasionally substitutes koumyss or kefir, or sometimes some of the infants' foods. He permits eggs occasionally, where this is desired, provided no increase in the albumen appear in the urine. Vegetable diet without condiments is also to be recommended. All ardent spirits are to be avoided. The most commendable is apple wine or other fruit wine that will produce diuresis without

injury. Out-door gymnastics, baths, and rubbing the skin to relieve the kidneys are also necessary. Ziemssen followed Senator with a paper upon the symptomatic treatment of nephritis. In the treatment of the albuminuria in parenchymatous nephritis he advises caution in the use of drugs, but places reliance upon rest in bed, diet, and the use of dry and vapor baths as diaphoretics. Pilocarpine is of service in this last indication. In the interstitial form, which is due to intoxicants usually, the first indication is the neutralization of the poison, as by the administration of iodide of potassium for syphilis; after this the case is to be dealt with symptomatically, as digitalis in case the heart be weak, and blood-letting if the arterial pressure be high. Mosler emphasized the value of confinement to bed, catharsis, and the milk diet. Winternitz quite agreed with the other speakers as to the value of the milk diet, but prefers to begin it by small quantities. Ewald regarded the peptonization of the milk in the milk diet as highly important, and commended the use of iodide of potassium in large doses.

Zasiadko⁵⁸⁶_{No. 20, Nov. 4} finds, from experiments upon patients, that under the influence of vegetable food the daily amount of albumen is decidedly diminished, the arterial tension lowered, dropsy increased, the pulse slower and weaker, and the appetite gradually lost, the patient becoming weaker and more apathetic. Under animal food the albumen rose; so, too, the arterial tension; œdema disappeared, pulse became fuller and more frequent, body-weight decreased with loss of œdema, the amount of urine and its total solids increased; the general state improved, the patient becoming stronger and more cheerful. A mixed diet stood midway in its effects, approaching more closely that of the animal diet upon the albuminuria. From these experiments and others the writer concludes that the best diet for Bright's disease is a mixed one, animal predominating over vegetable in interstitial nephritis accompanied with weakness; in parenchymatous nephritis, with profuse albuminuria, vegetable food with milk should be in relative excess. Schreiber,⁶¹_{Nov. 25} from a series of experiments upon persons in varying conditions of health and renal disease, in relation to the albuminous or non-albuminous nature of diet in chronic nephritis, concludes that, inasmuch as Bright's disease is one of those affections that lead to gradual and generally progressive exhaustion of the bones,

the diet should be of a most comprehensive character. Hepburn¹⁸⁶_{Nov. 9} reports a case in which the exhibition of 6 raw eggs daily by the stomach not only did not cause an increase in the albuminuria, but a distinct diminution. The Cutters⁶¹_{July 28} advise a well-regulated animal diet, the details of which are to be insisted upon, the principal article of diet being given in the shape of the famous Salisbury steak. They advise pure water only as a drink, passive exercise, and tonic medication.

At the Medical Congress at Rome, Bozzolo⁵⁷_{Nov. 17, 99} advised that, where bloodletting has been practiced in Bright's disease for the purpose of ridding the system of toxic substances, it should be replaced by the introduction of defibrinated blood, serum, or salt solutions. Diuretics are only to be employed so long as the heart is acting energetically. Where the heart's action sinks, the intestinal and dermal eliminative functions are to be called into aid; for the latter, the use of warm and vapor baths is commended. He combines with the milk diet a certain but limited amount of meats and eggs. In the acute hæmorrhagic form he uses tannic acid with effect; but in the chronic form does not find much value from the ordinary medicaments. In the discussion of this paper De Renzi recommended the employment of fuchsin and calomel in the chronic forms of nephritis, and for the purpose of diuresis hydrofluoric acid and sodium hydrofluoride.

Dujardin-Beaumetz,²⁰²_{Feb. 25}¹⁴_{May 28} commending in the dietary only such foods as those in which ptomaines do not readily form, divides the indications into two great heads, the first dealing with the elimination of toxins already in the system, the second with limiting the introduction of such toxins in the food. Among the diuretics he places great value upon caffeine, which possesses the advantage of easy hypodermatic administration, digitalis, and, in a less degree, strophanthus, as tensor diuretics; in the class of diuretics he includes the glucoses and lactoses, given either by the stomach or rectum, given in solution, several hundred grammes during the day. In order to neutralize the toxins, inhalations of oxygen stand in the first order. General bloodletting is also of value. The second indication is met by regulating in every way the digestive function, and by diet. The patient should live exclusively upon milk, eggs, starches, green vegetables, and fruits.

Wilson⁷⁴_{Oct., 99} reports excellent results from the use of a combi-

nation of ergot, iron, and creasote, albuminuria diminishing, œdema disappearing, and the general condition showing great improvement in two cases recorded. Memminger²⁰² July 28 recommends highly the use of sodium chloride in 10-grain (0.65 gramme) doses in capsules thrice daily, as a means of diminishing the albumen excretion. This treatment may be combined with the usual dietary regimen. Feeny⁴⁵⁴ Apr. reports the rapid disappearance of œdema and uræmic symptoms from the administration of antipyrin. Bonchoneff⁵⁸⁶ ⁶⁷ Nov. 2; Apr. 20 has studied the effect of ichthyol in the form of sodium ichthyolate, given in amounts varying from 60 to 120 centigrammes (9 to 19 grains) in capsules. In 10 cases he observed no result. In 2 cases of chronic nephritis, with some febrile tendency, the albumen rapidly diminished, but the author remarks that this diminution had begun before the administration of the remedy. He concludes that ichthyol is valueless in these cases, and disapproves of it because the patients complain of its disagreeable properties and destruction of the appetite. Primavera⁶⁷ Dec. 15, '99 disapproves highly of the use of iodides in Bright's disease, as they are irritative to the renal epithelial cells. Articles are published by Dujardin-Beaumetz, ⁶⁷ Nov. 20, '99 ³ Jan. 15, Dec. 4, '99 Zavadski, ⁶⁷ Dec. 20, '99 and Meilach, ⁶⁷ Jan. 15 upon the subject of glucose and lactose, all of which agree in attributing to these substances a diuretic action.

ANOMALIES OF THE KIDNEYS.

Cullen¹⁰⁰ Nov. describes a horseshoe kidney, the upper parts on a level with the twelfth dorsal vertebra, the isthmus on the third lumbar vertebra. It was supplied by an artery from the aorta to the left part of this double organ, none entering the right except small branches from the supra-renal. Two cases of congenitally atrophic kidneys, in both cases described affecting the left organ, are published by Tange.²⁰ Potain¹⁰⁰ Aug. 21 describes, as a new form of misplacement, an anteversion of the kidney. It is rarely met and is at first hard to diagnose. It is usually met on the right side, the upper part slipping forward under the liver and may upon careful palpation be felt below the floating ribs. It seems, in a large proportion of cases, to be associated with biliary lithiasis. Laude⁷ Apr. 16 reports a congenital displacement of the right kidney to the superior straits, receiving its arterial supply from the right iliac.

Floating Kidney.—In a discussion upon this subject before the Medical Society of Berlin,¹⁵² in which Virchow, Landau, Guttmann, and others participated, considerable weight was attached to the view that this condition is apt to represent a general tendency toward relaxation, seen in the attachments of the intestines, liver, and other organs as well; this tendency followed conditions of enlargement of the abdominal cavity from various causes, particularly in cases of emaciation in such subjects. Kuttner,³⁶ Aug. 4, Apr. 14, 21, 28, in speaking of palpable kidneys, recognizes four forms: (a) where the organ shows respiratory mobility without important displacement; (b) where a portion of the organ can be distinctly felt, the displacement anterior, motile with respiration, and can be pushed out of place by the hands; (c) the decidedly floating kidney; (d) dislocated but fixed. The last class is usually congenital in origin, but may be acquired by fixation of a movable kidney in an abnormal position. The most marked cause seems to be the loss of the fatty capsule, which is replaced by a loose net-work of tissue, which gradually gives and permits the formation of a mesonephron; tight lacing is also a cause. But the ordinarily regarded factors, as pregnancy, pendulous abdomens, abortions, menstrual renal hyperæmias, really have little importance. Kumpf⁸⁴ May 10, May 8, holds much the same views, attaching more importance, however, to trauma and localized inflammatory processes than expressed by the previous authority. Cases of floating kidney are mentioned by Scheinkman⁵⁹ Aug., in a woman of 48 years of age, of healthy constitution, the mother of twelve children, who had noticed the tumor in the right side for eight years, it having appeared after one of her confinements; by Hirschfelder,¹⁴⁷ Nov., in two males, both anomalies of the right side, neither having any definite cause (in one of which a prominent feature was hæmaturia); by Steiner,¹¹³ Jan., occurring on the left side of a woman aged 50 years, without definite cause, the kidney being the seat of several rather large cysts; and by Drummond,⁶ Jan. 11. The last-named writer mentions over 30 instances, most of them occurring in women who had had children; in 3 of them hæmaturia was a symptom, in most there were dragging pains and a dyspeptic tendency noted. Koranyi⁴ Nov. 21, Nov. 1, believes that in dress, besides tight lacing, the habit of suspending the weight of the dress upon the constricted waist, and particularly the high-heeled shoes, tend to produce this condition. The latter

cause operates by causing an increase in the lumbar curve, bringing the kidneys forward and stretching the peritoneal covering. Courvoisier⁷³_{Dec. 28, '78} reports entire success in the cure of 7 cases of floating kidney by fastening the organ to the lumbar muscles by ligature. For this purpose the organ is fastened by silken ligatures, not catgut, and the wound permitted to heal by granulation, iodoform gauze being used as a dressing for the wound.

TUMORS OF THE KIDNEYS.

A rare tumor formation in this region is mentioned by Eiselsberg, ⁸_{Jan.}, in the occurrence, in a 70-year-old woman, of a fibrolipoma of the fatty capsule of the left kidney. The tumor was hard, dense, on section showed a concentric arrangement of the fibres, and consisted of two bodies, between which the normal kidney lay. The tumor measured 35 centimetres across the two nodes, and weighed 4 kilogrammes (8 pounds). There were no urinary symptoms. Louis⁷_{Nov. 2, '25} describes in a child of 7 months, with hypospadias and cleft scrotum, a tumor of the left kidney as large as the head of a child of a year's age. The lower third of the other kidney was also the seat of neoplastic tissue. Under the microscope the tumors were determined as lymphadenomata. The urine had been uniformly normal. Souques⁶⁷_{Dec. 4, '90} records the occurrence of a small adenomatous tumor of the right kidney of a man aged 60 years, which had not produced any evidence of its presence in life. The tumor was about the size of a hen's egg, and made up of a number of nodes held together by dense connective tissue. The nodules were of epithelial nature, the cells of a somewhat cylindrical shape, and seemed to be of an adenomatous disposition. There were no secondary deposits from the growth; nor were there other tumors found in the body to which this might have been secondary. Albarran⁶⁷_{Feb. 21} describes a tumor in the right kidney of a man aged 53 years, which in life was accompanied by hæmaturia and the possibility of feeling the tumor by renal ballotement. It was about the size of a large egg, at the upper part of the kidney, adherent to the adrenals, and seemed to be adenomatous or epitheliomatous, with areas of fatty change in the central parts. There was no evidence of metastasis. Barrie⁶⁷_{Nov. 22, '90} records an exceedingly interesting case of primary cancer of the right kidney of a man aged 40 years, marked by pain, especially on

pressure, in the right side, and by hæmaturia. The kidney weighed 750 grammes; the supra-renal body was not affected; there were secondary nodes in the left kidney, in the lungs and pleuræ, and in the epididymis of the right testicle. Only a small portion of the renal structure was left; the capsule of the organ was not broken through. Histological examination indicated its epitheliomatous nature. Lancereaux¹⁷_{Feb.26} describes a tumor of the left kidney of a man aged 57 years, the histological examination of which showed it to be of an ordinary cancerous type. The tumor measured 12 by 14 centimetres; the ascending vena cava was almost obstructed by a mass partly cancerous, partly clot. There were no other evidences of generalization. Hæmaturia and pain were both features of the symptomatology. Delorme¹²²_{Apr.} describes a case of malignant tumor, thought to be cancerous, in the left kidney of a child 3½ years of age. Kernig²¹_{Aug.9} records a case of primary cancer of the right kidney of a woman aged 59 years, with metastatic foci in the lungs, heart, liver, and peritoneum. Czerny¹⁵⁸_{Nov.11, '99}; ²⁵_{June 20} reports a case of primary cancer of left kidney in a child aged 3½ years.

There is recorded,²_{Oct.25} as presented before the Northumberland and Durham Medical Society, a sarcoma of the kidney, in which case the growth had involved and greatly distended the inferior vena cava and extended up the vessel until it projected into the right auricle. There were no other growths elsewhere. Sarcomata of the kidney are described in children: by Warner,⁵¹_{Oct.} in a child aged 6 months, in which case there was a history of injury, the growth a spindle-celled sarcoma, no metastasis; by McCassey,¹⁰²_{Mar.} in a child of 3½ years, the tumor, of left kidney, weighing 4 pounds, no metastasis; by King,⁹_{Dec.21, '99} as a congenital tumor of both kidneys; and by Burt,⁸⁹_{Aug.1} in a child 18 months old, the growth appearing about six months before death, the affected organ, the left kidney, weighing 44 ounces, no metastasis. A probable case in a boy of eight years, in whom the growth had appeared one and a half years previously, but without serious apparent impairment of health, is recorded by Jacobi.¹⁶⁰_{Apr.} Rieder³⁴_{Apr.29} reports a case of primary round-celled sarcoma, recognized as such in a man of 37 years of age, its removal, and the recovery of the patient. Sarcomatous elements and blood were recognized in the urine. A similar case, followed, however, by the death of the patient, a man

of 40 years of age, is recorded by Heitzmann,¹⁵⁰ in which case the writer had recognized the sarcomatous elements in the urine. There was no metastasis in either of these cases. Israel,⁴¹ reports a successful removal of a renal sarcoma from a lad aged 16 years, in whom the growth had existed for two years. There were several enlarged lymphatic glands near by, which were also removed. Spiers⁵⁹ mentions a case of malignant tumor of the left kidney in a man aged 58 years, the exact nature of which was not determined. Hæmaturia was a marked feature of the case, but there does not appear to be any pain except on pressure.

RENAL CYSTS.

Sangalli⁶¹⁶ reports a case of a man aged 67 years, in whose body, at the autopsy, the left kidney was found replaced by a mass of echinococcus cysts. Bland Sutton⁶ describes a kidney and ureter which had for many years been preserved in the museum of the Middlesex Hospital as an example of mucous cysts in the ureter. Recently, examination of these small follicular cysts in the ureter and in the kidney had shown the presence of psorospermial bodies. In the discussion following the above case, Silcock related a case of parasiticism by psorospermia in a woman aged 53 years, the liver, spleen, and ileum showing the presence of these parasites. A case of enormous polycystic kidneys, the left weighing 2350 and the right 1000 grammes, is described by Lamy⁷ in a woman aged 69 years. The cysts were of large variety, four or five being present in each organ. The heart was hypertrophied and the vessels atheromatous. Lamarq¹⁸⁸ records the occurrence of small polycystic kidneys in a woman aged 53 years, suffering from irregularity of the cardiac action, general œdema, and polyuria. The renal condition was not recognized in life. The kidneys were fairly riddled with cysts of varying size. Dunn¹⁰⁵ mentions a polycystic kidney, removed from the body of an old woman dead from uræmia, in which the kidney reached the enormous weight of 6½ pounds, being filled with cysts varying in size from that of a pea to that of a cherry or larger. The fellow was also cystic, but in less marked degree, and was only slightly enlarged. A double cystic condition is published by Brennan,¹²² in a man of 68, in one of which a calculus of some size was found. Left kidney weighed 31 ounces, the right 22.

Hydronephrosis.—Street¹¹⁷_{Mar.} places upon record a case of double hydronephrosis due to obstruction of the ureters at point of entrance into the bladder by the thickening and infiltration of the bladder-walls from vaginal and uterine cancer. Braun,⁸⁴_{July 11,} along with several other cases, records an intermittent hydronephrosis depending upon an acute bending of the ureter in its upper portion. Cases of double hydronephrosis are published by Pilliet⁷_{Dec. 20, '90} in an old man, from unknown cause, in whom the kidneys were sclerosed and cystic and the heart distinctly hypertrophied; and by Villard,²¹¹_{June 4} in which case, too, the kidneys were cystic and the cause of the hydronephrosis was not recognized. Unilateral cases are reported by Ritchie, without appreciable cause, and by Russell, due to obstruction of the ureter by a calculus.³⁶_{Nov.}

RENAL SUPPURATION, ETC.

A case of perinephritic abscess, apparently due to rupture of the kidney from traumatism and subsequent infection, is reported by McBurney.⁷⁶⁰_{Dec. 14, '90} Fussell⁹_{Nov. 20, '90} records a case of cystitis following pregnancy, the infection passing up the right ureter into the pelvis of the kidney. Subsequently a right-sided perinephritic abscess developed, and was operated upon with ultimate success. A case of perinephritic abscess operated upon with entire success, the cause of the suppuration unrecognized, occurring in a young man 19 years of age, is published by Alrich.¹¹²_{Feb. 1} The death of the lamented Vassiadis, President of the Imperial Medical Society of Greece, is commented upon by Macris,²⁸²_{April 20} and is stated to have occurred from the results of a perinephritic abscess which resulted from extension of the renal inflammation caused by calculous disease of the left kidney. Two cases are reported by Maddox,²³⁸_{Aug.} one occurring in a young man after a history of injury to the lumbar region; the other in a woman, and without appreciable cause. Cases of pyelonephrosis are mentioned by Criado¹⁵⁷_{Apr.} as following a displacement of the kidney; by Davis⁷⁶⁰_{Jan. 10} and Bax²³⁰_{Nov., '90} as due to pelvic calculi; by Ritzo,²³²_{Apr. 2} a case of renal lithiasis with secondary perinephritic abscess of the left kidney, the abscess-cavity communicating with the thoracic cavity. Out of 9 cases of abscess of the kidney, 6 cases of renal calculi were found by Guyon,⁷⁷⁹_{July} who urges the necessity for free operative measures in all these cases; and that in every way the safest course is to perform fully what is demanded at the

primary operation in order to avoid secondary nephrectomy, which much increases the risk. Tiffany¹⁰⁴_{May 10} reports a case of pyonephrosis in which both organs, one after the other, became the seat of suppuration requiring operation, which was successfully performed. The cause was extension of the process from the lower urinary passages. Wild²_{Feb. 22} presented before the Pathological Society of Manchester a horseshoe kidney, the right portion of which was converted into a sac of pus, in which were found 3 small, dark, hard calculi, spiculated. The right ureter was dilated, the bladder inflamed, and through a fistula from the urethra into the rectum the man had passed his urine *per rectum* for a time. A successful operation upon an abscess of the kidney of a man aged 39 years, cause unknown, is reported by McBurney.⁷⁰⁰_{Dec. 14, '90} Irwin⁹⁹_{Feb. 1} reports a case of pyonephrosis, following long-standing urethral stricture from gonorrhœa, in which both kidneys were extremely enlarged by abscess formation and retention cysts. The right kidney weighed 1335 grammes (43 ounces); the left, 760 grammes (24½ ounces). Schmorl⁵⁰_{Mar. 12} describes the discovery of thrush fungi in the kidneys of a case of thrush, the micro-organisms being found in small abscesses with minute cocci.

RENAL TUBERCULOSIS.

Israel,⁹⁹_{July 24} in a paper upon this subject, claims the occurrence of primary foci of tuberculosis in some cases in the kidneys, although he acknowledges the position of Steinthal in others, that the tubercular process is one advancing from the lower urinary tracts. Coffin¹⁰⁰_{Apr. 20} recognizes, from an anatomical point of view, four forms of tuberculosis in the kidneys: the miliary granulation, the tubercle of Laënnec, cheesy tubercular kidney, and tubercular nephritis. The manner of invasion of the kidney by this tubercular process is through the vascular system, and Coffin does not look with favor upon the theory of tuberculosis ascending along the mucous surface from the lower urinary passages. Leclerc and Fournier²¹¹_{Nov. 3} publish the records of a case in which, the other organs normal, there were found at post-mortem a typical tubercular, broken-down, right kidney, the ureter somewhat thickened, a left kidney with miliary tubercles in the cortex, ureter normal, and recent tubercular broncho-pneumonia at the apices of the lungs. Wilson¹⁵⁷_{May} describes, as found in the body of a boy of 8 years, pulmonary tuberculosis,

tubercular nodules in the spleen and probably in the liver, and a tubercular left kidney, without evidence of its extension from the lower urinary tract. Heuston¹⁶_{Dec., '90} has met, in a boy of 13 years of age, an example of tubercular kidney, which, in the absence of evidence of tubercular disease elsewhere, he regards as a case of primary renal tuberculosis. Beaver,⁶_{Dec. 31, '90} in a child aged 3 years, found the right kidney in an advanced state of tubercular change, unassociated with any other evident tubercular processes in the rest of the body. Gurko,²¹_{June 23} records the occurrence, in the body of a young man, of a tubercular degenerated right kidney, a recent tubercular deposit in the bladder, the prostate, the right testicle, and a slight degree in the lungs. Reilly²¹⁶_{Nov., '90} publishes a case of a young woman, whose trouble dated over two years prior to her death in the existence of vesical pain. Pulmonary symptoms manifested themselves two months previous to death. At autopsy tubercular deposits were found throughout the lungs and pleuræ, the left kidney in advanced condition of tubercular degeneration, the outer wall greatly thickened, as well as that of the bladder, and at the opening of the left ureter a large ulcer. The peritoneal glands were in a state of tuberculous degeneration. Mossé²⁹⁸_{July 19} mentions a case of advanced renal tuberculosis which presented so few symptoms that it was in life regarded as a case of interstitial nephritis.

DISEASES OF THE BLADDER.

CYSTITIS, ETC.

Morris,¹_{Feb. 10} calls attention, as a rarely described form of cystitis, to fissure of the neck of the bladder extending into the urethra, particularly met in women, and to be recognized by means of a urethral speculum. It appears as a narrow gray ulcer, caused by micro-organisms, perhaps by the scratch of a passing bit of gravel or by compression of folds of the mucous membrane. It is exceedingly painful, and is to be treated by dilatation of the urethra and local applications, or by the formation of a vesico-vaginal fistula. A case of membranous cystitis of several years' standing, in a man 40 years of age, the condition being preceded by an acute attack, is described by Cabot.²⁴⁵_{July 1} ⁹⁹_{July 2} In the treatment of the painful cystitis so frequent in women, so far as operative procedures are concerned in the severe and more resisting forms of the affection,

kolpocystotomy, by a median line 2 or 3 centimetres in length, entering the bladder back of the urethral opening, and placing a tube through the fistula for lavage, is commended by Doublet,⁷⁰ Feb. 22; forcible dilatation, with paralysis of the urethra, is preferred by Madden,²² July 2, and by McGuire.⁶⁴⁷ Jan. Among the remedies which are mentioned in the treatment of cystic inflammation salol is highly commended by Dreyfous,¹⁷ Nov. 20, '90; Arnold,²² Feb. 26, and Abbott,⁹⁹ July 17; saccharin is reported favorably upon by Colquhoun,⁵⁵⁷ Oct. 1, '90, and Smith,⁵⁹ Nov. 16, '90, and ²⁴ Jan. 19; a proprietary substance, known as "Nutrolactis," has seemed to Bryce¹¹⁷ to produce valuable effects in the chronic forms of cystitis; the fluid extract of pichi, in doses of 30 or 40 drops several times daily, is recommended by Carpenter.⁸⁵⁶ Aug. As local measures Stone,⁸¹ Dec. '90, lauds, in chronic cystitis, dilatation of the viscus by hot-water injections; Parvin,⁹ Nov. 20, '90, has had very satisfactory results from washing out the bladder with a warm 2-per-cent. solution of creolin by means of a Hegar funnel apparatus; solutions of blue pyoctanin (1 to 1000) used to wash out the bladder produced rapid cures in cases of gonorrhœal cystitis and 1 case of rheumatic origin in the hands of Mencki,⁵²⁰ Nov. 20, '90; Moricourt,¹⁰⁰ May 22, reports excellent results from the administration of pills of chloride of silver (2 milligrammes— $\frac{31}{1000}$ grain) and sulphate of zinc (5 milligrammes— $\frac{77}{1000}$ grain) in a case of vesical neuralgia where all other therapeutic measures employed had proved unsuccessful. Washing out the bladder with solutions in which iodoform is suspended has been followed by cure in several chronic and persistent cases of cystitis, as reported by Edgar,²⁸² Jan. and by Frey.¹⁰⁰ Jan. 16. Guyon,³²⁹ Nov. 20, '90, believes that in almost every instance vesical infection is the result of catheterization practiced without due antiseptic precaution, when there is some degree of urinary infection present. In an ordinary bladder there is little danger, but when retention prevails every effort at strict antisepticism is not too much. Spehl,³²⁹ Nov. 20, '90, has invented an apparatus for facilitating vesical lavage. It consists of three tubes joined in the form of a triangle, each provided with a stop-cock. To one of the tubes forming an angle of the triangle is attached the supply-pipe for the entrance of the solution, to a second is applied the catheter, and to the third the pipe carrying off the return flow from the bladder. This last being cut off by shutting the stop-cocks, the water is forced into the catheter-tube and into the bladder; shutting off the supply by means of its

stop-cock, the water in its return passes out of the waste-tube into the receptacle provided for the purpose. Worrall²⁸⁷_{Dec. 15, '99} recommends, as a means of avoiding cystitis in those in whom continuous catheterization is required, a glass catheter, with the opening at the point, an instrument easily cleaned and sterilized. Roosing, quoted by Levison, corresponding editor, has made bacteriological studies in relation to 30 cases of cystitis, 29 of which gave positive results. In 3 of the cases tubercle bacilli were recognized; in the rest various forms of cocci or cocco-bacilli, most frequently those of suppuration. These bacteria he proved to possess the power of breaking up urea into ammoniacal bodies, and were regarded by him as at least perpetuating the inflammatory condition, if not having incited it. In treatment he injects a solution of nitrate of silver (Guyon) of 2- to 4- per-cent. strength. Manton²⁸⁴_{Feb.} reports several cases of urinary retention in which the retention brought about a condition of distension of the viscus, and, on rapid emptying of the organ, more or less marked hæmorrhage.

Anomalies and Tumors of the Bladder.—Fischer¹⁵⁰_{May} exhibited, before the Society of German Physicians of New York, a child of 2½ years of age with ectopia of the bladder.

Guyon,⁵⁵_{Jan.} in a clinical lecture, mentions 3 cases of vesical tumor, the specimens from which he discussed—one a small, pediculated growth, situated at the neck of the organ, another tumor weighing 60 grammes, and a third a large one of the left wall of the bladder. These tumors of the bladder are, in Guyon's experience, almost invariably of an epitheliomatous nature, 19 out of 22 cases operated upon by him being of this character, although the occurrence of a mixed type, in which papillomatous character presents, is not infrequent. The diagnosis of pure papillomata in many of these instances is at fault, the section of the neoplasm being made too superficially, and not in the deeper parts, which usually manifest the epitheliomatous structure; the recurrence of these tumors, too, argues strongly in favor of their epitheliomatous nature.

CALCULOUS DISEASE.

In an experimental study, Neuberger²⁷³_{Apr.} finds that abundant calculous deposits are found in the renal tubules after poisoning by aloin, corrosive sublimate, or bismuth subnitrate. These deposits consist of the carbonate and phosphate of calcium. Slight deposits

may appear after administration of phosphorus, neutral potassic chromate, and a number of other substances having a toxic action on the renal tissue. The deposits met with after several hours' ligation of the renal artery are quite like those from sublimate poisoning; in case of permanent ligation the calcification becomes intense, even the glomeruli being affected. Poisonings by oxalic acid are followed by deposit of oxalate of lime in the same manner as in case of the deposits of the other salts of lime mentioned. Gennaro⁴⁸⁷ describes the occurrence of a calculus as large as a bean in the urachus, formed from ammoniacal fermentation of urine which had been retained in a curve of the patulous urachus. The stone was expelled by the umbilicus, during which period the patient was afflicted by a severe vesical spasm.

Hance,¹ records the accidental discovery of an oxalate-of-lime calculus in the body of an infant aged 20 months, who had died of pulmonary tuberculosis and whooping-cough. d'Antona⁵⁰⁵ reports a case of hydronephrosis of large size, of the left kidney, due to impaction of a uric-acid calculus in the ureter; the condition was relieved by operation and the patient recovered. Féréol³ reports a case of a man with gouty heredity, with a history of passage of a calculus some years previously, who recently suffered from an anuria lasting eight days, stopping suddenly, and followed by expulsion of a small calculus and an intense polyuria. From this attack the patient recovered, but several months later the writer reported another attack of anuria, in which death occurred. An editorial writer,¹ in reviewing Jacobson's article upon renal calculus, mentions that, in the experience of the latter, a valuable symptom is the hæmaturia, rarely profuse, more or less intermittent, the blood intimately mixed with the urine. This symptom is, however, at times totally absent. The pains from renal stone are of two forms,—the fixed and the reflected. The former is of an aching, dull character, increased by exercise, and often worse at night. The radiating is not rarely felt in the testicle or in the lower portions of the urinary tract. In performance of nephrolithotomy he advises that the ribs be carefully counted to be certain of avoiding the pleural cavity, which is known to have been opened in this operation. If the patient be stout, with a deep loin, König's incision is advised, or a T-incision. The colon should be packed away with sponges, the stone searched for by palpation of the

kidney and acupuncture of calices of the kidney, or even by incision, if these fail. If the kidney be suppurating, nephrectomy should not be performed until after thorough drainage and the condition of the other kidney be estimated. Finally, if the kidney be much disturbed in nephrolithotomy, it should be carefully stitched in place. Clarke²_{May 94} records a case of spontaneous fracture of a renal calculus and passage of a fragment. Rollet²¹¹_{Apr. 9} reports the spontaneous expulsion through the female urethra of a calculus weighing 20 grammes, measuring 2.9 centimetres in the short and 3.8 centimetres in the long axis. Hannon⁹_{Nov. 8} and Claiborne⁸¹_{Dec., 79} report valuable solvent properties of Buffalo Lithia Spring water in the treatment of urinary calculi.

ENURESIS.

An editorial,⁶¹_{Nov. 3, 79} in commenting upon this condition, calls attention to the fact that in children it is rarely the result of any nervous irritability of the bladder, and inveighs against the indiscriminate use of nervous sedatives, as belladonna, in such cases. Regarding it rather, as it seems to be in reality, as a lack of power of retention, due to enfeeblement of the voluntary portions of the sphincters of the urethra and at the apex of the prostate, the better treatment would seem to be stimulation of these muscles by strychnia, rhus aromatica, and especially by electricity, after the method of Guyon and Jarnin, introducing the insulated electrode into the urethra to the apex of the prostate and withdrawing it several times, the other electrode being preferably applied on the side of the thigh. Oberländer¹_{June 7},⁴¹_{June, 79} regards enuresis in children, unless there be found some grave defects of development, as always due to reflex irritation in the urethra or other terminal openings. The neurotic theory is not sufficiently adduced. He bases the value of his theory upon the effects of circumcision and other operative procedures. In a general paper upon the subject, Swaney⁷⁶⁰_{May 94} mentions a case in a young girl, aged 13 years, persisting since early life, and very marked. In this case the enuresis was accompanied by frequent desire, and micturition was frequent by day as well as night. The bladder-walls, on examination, were found thickened and contracted, and the viscus could hold but 2 ounces (59 cubic centimetres) of urine without pain. The urine was highly acid. The writer gradually distended the bladder by injections of warm

water, the treatment continuing for six weeks, until about a pint ($\frac{1}{2}$ litre) was retained and urine could be retained for three or four hours. Acetate of potassium was then given to neutralize the acidity of the excretion, followed by rapid improvement. Van Tienhoven¹¹⁸_{Aug. 24} holds that incontinence of urine in children depends upon insufficiency of the sphincter vesicæ muscle, which allows the urine to enter into the upper part of the urethra, whence it is expelled by a reflex action of the detrusor urinæ muscle. To prevent the incontinence, the author recommends that the little patients sleep upon a bed with the foot-end raised so as to keep the urine away from the neck of the bladder, thus removing the source of irritation. In 14 children thus treated a cure was obtained without the use of any drugs, the only precautions being that the patients have thoroughly emptied the bladder before retiring, and that no fluids have been taken for a time before retiring. Kupke⁶_{Nov. 22} regards the condition at fault to be either diminished activity of the vesico-spinal centre or a partial anæsthesia of the sensory nerves of the bladder. Where deep sleep occasions the loss of vesical control, he suggests that a light be kept burning to lessen the depth of sleep. In the electrical treatment he prefers faradization, a large flat electrode being placed over the last dorsal and first lumbar vertebræ, and a small one moved with stroking over the vesical region. In medicinal treatment he recommends rhus aromatica and strychnia. The former drug is also recommended by Powell,¹⁸²_{May} who mentions 16 cases in which favorable results were obtained by this remedy. Atropia, or belladonna, is favorably mentioned by Levison, corresponding editor, who reports that Erbe has studied the effects in 100 children, 68 of whom were cured and 17 improved; by Salter,⁶_{Nov. 22, '99} in a case persisting from early infancy until in the seventeenth year; by an editorial writer,⁶⁵_{Jan.} in a case persisting from infancy until in the ninth year; by Owen,²²_{Feb. 22} by James,⁶¹_{July 26} by Thomas,⁶⁶³_{July} and Davis.¹⁰²_{Nov.} Adler²⁰²_{Feb. 10} gives favorable reports of the use of normal liquid of ergot in 24 cases, only 1 of which was not cured, but was benefited. The medicine was given in doses of from 20 drops to 2 fluidrachms (7.39 cubic centimetres) in water thrice daily, nausea being overcome by dilution of the drug. Cases which were corrected by the adjustment of the uterine body, the enuresis having been occasioned by displacements in adult women, are reported by Tauffer⁵⁷_{Aug. 10} and

Humphrey,¹⁹⁹_{May} and a case is related by Davenport,¹_{Nov.} due to malposition of a ureter, which was successfully operated upon.

DISEASES OF THE ADRENALS.

Stilling,²⁰_{Dec., '86} working on young rabbits, found that on removal of one supra-renal body the other hypertrophied to marked degree, that at times if a portion of one of these bodies be removed the remainder will increase to natural size and structure, and that often after extirpation secondary glands developed somewhere in the neighborhood having the same appearance as the ordinary adrenal. From these facts he argues a post-embryonic function for these bodies. With this last observation the announcement of the frequent discovery of adrenal accessory bodies upon the semilunar ganglion and in the midst of the solar plexus by Jaboulay²¹¹_{Nov.} accords. Tizzoni⁷⁷⁹_{Mar.}²⁵_{Feb.} believes, from his investigations upon rabbits and dogs, that the adrenals stand in intimate relation with the central nervous system, and that their affection is the cause of the train of phenomena known as Addison's disease. Upon extirpation of one adrenal even, eventually the animal dies, presenting distinctive degeneration in the central nervous system, with congestion, disturbance of lymph circulation, alteration of vessel-walls, hæmorrhages, and extravasations. The cerebral changes are mainly seen in the floor of the fourth ventricle, about the roots of the pneumogastric, glosso-pharyngeal, accessorius, and auditory nerves. In the cord the changes are seen mostly in the gray substance and pia of the lower cervical and upper dorsal regions. Alezais and Arnaud³_{Aug., '89} report that the venous blood from the adrenals has, in reality, arterial properties, redness, and the double spectroscopic band of oxyhæmoglobin. Contrary to the observations of a number of other investigators, they regard, from experiments performed by themselves,⁴⁶_{Feb., '88, Apr., '89, and Nov., '89} the supra-renal substance as devoid of toxic power, and believe the only difference between the procedures employed in their own observations and those of previous workers to be one of greater antiseptic care in favor of their own.

Cases in which there existed pathological changes in the adrenals without the existence of pigmentary deposits in the skin or mucous membranes are reported as follows: In a newly-born, living but 18 hours, affected with congenital syphilis, Girode⁷_{Apr.}

found a gumma about the size of a small nut, no pigmentary changes being noted. A case of primary sarcoma in a man aged 55 years was found by Barth²⁵_{May 30, '90} in the left supra-renal body, with secondary nodes in the liver. There was no pigmentation; the temperature was persistently subnormal. Counsell⁶_{May} reports a case in which both (?) adrenals were the seat of numerous white, cheesy foci; the case ran a very rapid course, with many of the ordinary symptoms of Addison's disease, but without a trace of pigmentation, possibly because of the rapidity of the case. Vaughan²_{Nov. 16} reports a case of advanced caseation and suppuration of both adrenals, in a young man whose skin was slightly "muddy," but not bronzed; the prominent symptom in the case was a supra-orbital neuralgia. Cagliati⁵⁸⁰_{Nov. 3} reports a case of a young man presenting no symptoms whatever of Addison's disease, in the body of whom at necropsy both adrenals were found in an advanced stage of tubercular caseation. Jacquemard²²⁸_{Aug. 15} records a case of caseation of the right supra-renal capsule, the left being uninvolved, in which instance no traces of dermal pigmentation were noted. Ritchie³⁶_{July} recently met a case in which both capsules were the seat of cancerous disease, secondary nodules through the lungs, without the least pigmentation. Lancereaux³⁰⁰_{Jan.} agrees with those observers who deny a direct relation between diseases of the adrenals and bronzing of the skin. He records a case where one supra-renal body was intact, the bronzing nevertheless appearing; further, he records two cases in which extensive tuberculosis of both adrenals was present, and during life the patients showed such symptoms as great weakness, feeble heart's action, low temperature, and digestive disorders, dying in coma, but were without a trace of dermal discoloration. Where there was discoloration, in his experience, Lancereaux found extensive disease of the nerves and ganglia of the abdominal sympathetic. A similar view is held by Nothnagel, ²²_{Jan. 15, '90}, who illustrated his remarks in a clinical lecture by the presentation of an ordinary case of Addison's disease. Fleiner⁴_{Dec. 22, '90} adds to the cases substantiating this view of the affection a case in which pigmentation was noted, and in which, at the autopsy, a cancer of the stomach was found extending from the posterior wall of that organ into and completely involving the left adrenal. The right adrenal was normal. The right sympathetic was normal from the upper cervical ganglion to where the splanchnic is given off, from which

point both these nerves were thickened. The right semilunar ganglion, the celiac plexus, and two ganglia above the left supra-renal were involved. Mann,⁶_{Nov.16}; ²_{Oct.18} in 2 cases of Addison's disease with pigmentation, with caseation of both supra-renals in each case, was able to demonstrate the normal condition of the ganglia in both cases. The ordinary features of Addison's disease—pigmentation of the skin, associated with cheesy adrenals—are illustrated by cases reported by Caven,³⁹_{Sept.1} Sjoström³¹⁹_{No.11} (in which case the semilunar ganglia were increased in size and hard, but not cheesy, and in the cheesy adrenals of which tubercle bacilli were recognized), Schmaltz,⁶⁰_{Sept.4} and Watson.⁶¹_{Apr.10} Cases presenting the usual symptoms shown during life in Addison's disease are reported before death by Mackenzie,⁶_{May 18} (in which the case was of unusual duration, having already existed about five years), Fox,²⁴⁵_{Feb.} and Schreiber.⁴_{Oct.13} Ohmann-Dumesnil²⁰⁷_{July} records a case in which, associated with the ordinary symptoms, there occurred a sudden attack of bromidrosis, indicating to the writer a rather serious involvement of the sympathetic nervous system. Katz⁶⁶⁰ has studied the urine in this disease, but found no distinct and characteristic alterations. Kleinwachter,⁶_{Jan.26} in studying the female generative organs in a case of Addison's disease, found considerable nutritive disturbance in them and in the mammæ. The *mons veneris* was free from hair and fat, the labia flaccid, the vagina patulous, with its walls tending to prolapse. The uterus was small, thin-walled, and flaccid; the ovaries were atrophic. The menstrual flow had ceased for nine months, and with it all sexual desire. The mammæ had entirely disappeared. Cantani³⁵⁷_{Apr.1} is inclined to believe the essential change in Addison's disease is to be found in disease of the adrenals. In the matter of therapeutics, medical measures are restricted to combating symptoms as they present. Hygiene and diet are the most essential elements in the treatment, although the judicious use of remedies such as quinine, Fowler's solution, iron, and phosphates in some cases prove of service. In violent vomiting, morphia should be used, with belladonna. Where marked prostration is present, ether, or lemonades of lactic or hydrochloric acid, will prove serviceable. As to electricity to the abdominal sympathetic, the author believes that nothing but danger may be expected from it. Nothnagel, so far as general medication is concerned, agrees with the above and commends the use of iron in some form.

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41. Deutsche medizinische Zeitung, Berlin.
42. Internationales Centralblatt für Laryngologie, Rhinologie, und verwandte Wissenschaften, Berlin.
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44. Southern California Practitioner, Los Angeles.
45. Archiv für Dermatologie und Syphilis, Vienna.
46. Marseille-médical, Marseilles.
47. Brain, London.
48. Annales de gynécologie et d'obstétrique, Paris.
49. British Gynecological Journal, London.
50. Centralblatt für Bakteriologie und Parasitenkunde, Jena.
51. Archives of Pediatrics, Philadelphia.
52. Bulletin de l'Académie royale de médecine de Belgique, Bruxelles.
53. Cincinnati Lancet-Clinic, Cincinnati.
54. Fortschritte der Medizin, Berlin.
55. Gazette médicale de Paris.
56. Indiana Medical Journal, Indianapolis.
57. Internationale klinische Rundschau, Vienna.

58. Zeitschrift für Hygiene, Leipzig.
59. Medical Record, New York.
60. Mittheilungen aus der dermatologischen Klinik der Charité, Berlin.
61. Journal of the American Medical Association, Chicago.
62. Annales de la polyclinique, Paris.
63. Revue pratique d'obstétrique et d'hygiène de l'enfance, Paris.
64. Medical Abstract, New York.
65. St. Louis Courier of Medicine.
66. Archives of Otology, New York.
67. Bulletin général de thérapeutique, Paris.
68. Centralblatt für Nervenheilkunde, Psychiatrie und gerichtliche Psychopathologie, Coblenz.
69. Deutsche medicinische Wochenschrift, Leipzig.
70. Gazette hebdomadaire des sciences médicales de Bordeaux.
71. Illustrierte Monatsschrift der ärztlichen Polytechnik, Bern.
72. Kansas City Medical Index, Kansas City, Mo.
73. Le progrès médical, Paris.
74. Memphis Medical Monthly, Memphis, Tenn.
75. Neurologisches Centralblatt, Leipzig.
76. Ophthalmic Review, London.
77. Pacific Medical Journal, San Francisco.
78. Revue générale d'ophtalmologie, Paris.
79. Sanitarian, New York.
80. Therapeutic Gazette, Detroit.
81. Virginia Medical Monthly, Richmond.
82. Weekly Medical Review, St. Louis.
83. Zeitschrift für physiologische Chemie, Strassburg.
84. Wiener medicinische Wochenschrift, Vienna.
85. Texas Courier Record, Dallas, Tex.
86. Southern Practitioner, Nashville, Tenn.
87. Revue médico-pharmaceutique, Constantinople.
88. Prager medicinische Wochenschrift, Prague.
89. Obstetric Gazette, Cincinnati.
90. Medical Chronicle, Manchester.
91. Revue de chirurgie, Paris.
92. Revue de médecine, Paris.
93. Sanitary Journal, Glasgow.
94. Archives de neurologie, Paris.
95. Archiv für Gynäkologie, Berlin.
96. Annals of Surgery, St. Louis.
97. Mesdunarodnaja klinika, Warsaw.
98. Alienist and Neurologist, St. Louis.
99. Boston Medical and Surgical Journal.
100. Gazette des hôpitaux, Paris.
101. International Journal of Surgery, New York.
102. Kansas City Medical Record, Kansas City, Mo.
103. Medical Classics, New York.
104. Maryland Medical Journal, Baltimore.
105. Northwestern Lancet, St. Paul, Minn.
106. Omaha Clinic, Omaha, Neb.
107. Pacific Record of Medicine and Surgery, San Francisco.
108. Revue de thérapeutique médico-chirurgicales, Paris.
109. St. Louis Medical and Surgical Journal, St. Louis.
110. Texas Health Journal, Dallas, Tex.
111. Uniao médico, Rio de Janeiro.
112. University Medical Magazine, Philadelphia.
113. Wiener medizinische Presse, Vienna.
114. Zeitschrift für klinische Medizin, Berlin.
115. Western Medical Reporter, Chicago.
116. Therapeutische Monatshefte, Berlin.
117. Southern Medical Record, Atlanta.
118. Revue mensuelle des maladies de l'enfance, Paris.
119. Asheville Medical Review, Asheville, N. C.
120. Nashville Journal of Medicine and Surgery, Nashville, Tenn.
121. Medical Bulletin, Philadelphia.
122. L'Union médicale du Canada, Montreal.
123. Korrespondenzblatt der aerztlichen kreis- und bezirks- Vereine im Königreich Sachsen, Leipzig.
124. Anti-Adulteration Journal, Philadelphia.
125. Hall's Journal of Health, New York.
126. Revue des sciences médicales en France et à l'étranger, Paris.
127. Gazette médicale de Nantes.
128. Medical Era, Chicago.
129. Dosimetric Medical Review, N. Y.
130. Canada Medical Record, Montreal.
131. Bristol Medico-Chirurgical Journal, Bristol, Eng.

132. Archives of Gynecology, New York.
133. Medicinisches Correspondenz-Blatt des württembergischen ärztlichen Landesvereins, Stuttgart.
134. The Doctor, New York.
135. The Analyst, London.
136. Revue de laryngologie, d'otologie et de rhinologie, Paris.
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138. New England Medical Monthly, Bridgeport, Conn.
139. Medical Standard, Chicago.
140. Annali de freniatria, Torino.
141. Herald of Health, London.
142. Gazette médicale de l'Algérie, Algiers.
143. Daniels' Texas Medical Journal, Austin, Tex.
144. College and Clinical Record, Philadelphia.
145. Revista de medicina y farmacia, Paris.
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147. Occidental Medical Times, Sacramento.
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149. Peoria Monthly Medical, Peoria, Ill.
150. Medicinische Monatsschrift, N. Y.
151. Medical Analectic and Epitome, New York.
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153. Journal d'hygiène, Paris.
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156. Chemist and Druggist, London.
157. Brooklyn Medical Journal, Brooklyn.
158. Archiv für Kinderheilkunde, Stuttgart.
159. Sanitary News, Chicago.
160. Revue médicale de Toulouse.
161. Pittsburgh Medical Review, Pittsburgh.
162. Nouvelles archives d'obstétrique et de gynécologie, Paris.
163. Medical Missionary Record, New York.
164. La tribune médicale, Paris.
165. Journal de l'anatomie et de la physiologie normales et pathologiques de l'homme et des animaux, Paris.
166. Journal of Mental Science, London.
167. Baltimore Medical and Surgical Record, Baltimore.
168. Gazette médicale de Strasbourg, Strasbourg.
169. Centralblatt für die gesammte Therapie, Vienna.
170. Buffalo Medical and Surgical Journal.
171. Annales d'oculistique, Bruxelles.
172. Sanitary Era, New York.
173. Recueil d'ophtalmologie, Paris.
174. Ceylon Medical Journal, Colombo.
175. Nice-médical, Nice.
176. Medical Summary, Philadelphia.
177. Le praticien, Paris.
178. Journal of Physiology, Cambridge, Eng.
179. Gaceta médica de México.
180. Centralblatt für die gesammte Medizin, Leipzig.
181. Bulletin médical du nord, Lille.
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185. Physician and Surgeon, Ann Arbor, Mich.
186. Medical World, Philadelphia.
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190. Centralblatt für praktische Augenheilkunde, Leipzig.
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193. Moniteur de thérapeutique, Paris.
194. Bulletins et mémoires de la Société obstétricale et gynécologique, Paris.
195. Archives de médecine navale, Paris.
196. Southern Clinic, Richmond, Va.
197. Revue médicale de la suisse romande, Geneva.
198. Progress, Louisville, Ky.
199. Medical Brief, St. Louis.
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202. Medical Age, Detroit.
203. La normandie médicale, Rouen.
204. Archiv für Ophthalmologie (Gräfe), Leipzig.
205. Centralblatt für allgemeine Gesundheitspflege, Bonn.
206. Indian Medical Gazette, Calcutta.
207. Atlanta Medical and Surgical Journal.

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209. *Pharmaceutische Zeitschrift für Russland*, St. Petersburg.
210. *Medico-Legal Journal*, New York.
211. *Lyon médical*, Lyons.
212. *Journal de médecine et de chirurgie pratiques*, Paris.
213. *Glasgow Medical Journal*, Glasgow, Scotland.
214. *Correspondenz-blatt für schweizer Aerzte*, Basel.
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216. *Albany Medical Annals*, Albany, N. Y.
217. *Paris-médical*.
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219. *La clinique*, Bruxelles.
220. *Journal des sciences médicales de Lille*.
221. *Gazette médicale de Montréal*.
222. *Cleveland Medical Gazette*, Cleveland, O.
223. *Bulletin de la Société des médecins et naturalistes de Jassy*, Roumania.
224. *American Practitioner and News*, Louisville, Ky.
225. *Le Poitou médical*, Poitiers.
226. *Archiv für klinische Chirurgie*, Berlin.
227. *Leonard's Illustrated Medical Journal*, Detroit.
228. *La Loire médicale*, Saint-Étienne.
229. *Journal of Medicine and Dosimetric Therapeutics*, London.
230. *Gazette médicale de Picardie*, Amiens.
231. *Cook County Hospital Reports*, Chicago.
232. *Gazette médicale d'Orient*, Constantinople.
233. *Columbus Medical Journal*, Columbus, O.
234. *American Lancet*, Detroit.
235. *China Medical Missionary Journal*, Shanghai.
236. *Archives de tocologie*, Paris.
237. *American Journal of Pharmacy*, Philadelphia.
238. *Chemical News*, London.
239. *Indian Medical Record*, Calcutta.
240. *Virchow und Hirsch's Jahresbericht über die Fortschritte der Anatomie und Physiologie*, Berlin.
241. *Revue de l'hypnotisme et de la psychologie physiologique*, Paris.
242. *Journal of Nervous and Mental Disease*, New York.
243. *Archives de médecine et de pharmacie militaires*, Paris.
244. *L'électrothérapie*, Paris.
245. *Journal of Cutaneous and Genito-Urinary Diseases*, New York.
246. *Archiv für die gesammte Physiologie*, Bonn.
247. *Calcutta Health Journal*, Calcutta, India.
248. *Journal of Morphology*, Boston.
249. *Archives of Ophthalmology*, New York.
250. *Archives de l'anthropologie criminelle et des sciences pénales*, Paris.
251. *Annals of Hygiene*, Philadelphia.
252. *Zeitschrift für Medicinalbeamte*, Berlin.
253. *Journal d'oculistique et de chirurgie*, Brussels.
254. *Archiv für Augenheilkunde*, Wiesbaden.
255. *Jäger's Monatsblatt*, Stuttgart.
256. *Journal d'accouchements*, Brussels.
257. *Canada Lancet*, Toronto.
258. *Med. Temperance Journal*, London.
259. *Clinica*, Bucharest.
260. *American Monthly Microscopical Journal*, Washington, D. C.
261. *Journal of the New York Microscopical Society*, New York.
262. *Annales de l'Institut Pasteur*, Paris.
263. *American Journal of Psychology*, Baltimore.
264. *Nursing Record*, London.
265. *Centralblatt für Physiologie*, Leipzig.
266. *Annales des maladies des organes génito-urinaires*, Paris.
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271. *Dixie Doctor*, Atlanta.
272. *South African Medical Journal*, Cape Colony, S. A.
273. *Archiv für experimentelle Pathologie und Pharmacie*, Leipzig.
274. *Archives d'ophtalmologie*, Paris.

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276. Journal de médecine, de chirurgie, et de pharmacologie, Bruxelles.
277. Journal of Anatomy and Physiology, London.
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279. Medical Herald, Louisville, Ky.
280. Annales de la Société d'anatomie pathologique, Bruxelles.
281. Medical Advance, Chicago.
282. Montreal Medical Journal, Montreal.
283. Allgemeiner Wiener medizinische Zeitung, Vienna.
284. Maritime Medical News, Halifax, N. S.
285. Australian Medical Journal, Melbourne.
286. Archives de laryngologie, de rhinologie et des maladies des premières voies respiratoires et digestives, Paris.
287. Annales de dermatologie et de syphiligraphie, Paris.
288. La presse médicale belge, Bruxelles.
289. Archives roumaines de médecine et de chirurgie, Paris.
290. La pratique médicale, Paris.
291. Archives de médecine et de chirurgie pratiques, Bruxelles.
292. St. Louis Medical Journal, St. Louis.
293. Annales de la Société médico-chirurgicales, Liège.
294. Bulletin de la phthisie pulmonaire, Paris.
295. Allgemeine Zeitschrift für Psychiatrie und psychisch-gerichtliche Medizin, Berlin.
296. Les nouveaux remèdes, Paris.
297. Allgemeine medicinische Central-Zeitung, Berlin.
298. Gazette hebdomadaire des sciences médicales, Montpellier.
299. Annales de chimie et de physique, Paris.
300. Annales de physiologie, normale et pathologique, Paris.
301. Deutsche Zeitschrift für Chirurgie, Leipzig.
302. Jahrbuch für Morphologie, Leipzig.
303. L'abeille médicale, Paris.
304. La province médicale, Lyons.
305. L'année médicale de Caen.
306. Petit moniteur de la médecine, Paris.
307. L'impartialité médicale, Paris.
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309. Charité-Annalen, Berlin.
310. Jahrbuch für praktische Aerzte, Berlin.
311. Vierteljahresschrift für gerichtliche Medizin und Sanitätswesen, Berlin.
312. Monatshefte für Ohrenheilkunde, Berlin.
313. Monatshefte für Anatomie und Physiologie, Berlin.
314. Zeitschrift für Psychiatrie und gerichtliche Medizin, Berlin.
315. Archiv für Pathologie und Physiologie, Berlin.
316. Anatomischer Anzeiger, Jena.
317. Centralblatt für Gynäkologie, Leipzig.
318. Anzeiger über Novitäten und Antiquar der Medizin, Leipzig.
319. Centralblatt für klinische Medizin, Leipzig.
320. Archiv für Anatomie und Physiologie, Berlin.
321. Annales d'orthopédie, Paris.
322. Archiv für Anthropologie, Braunschweig.
323. Mittheilungen aus der ophthalmologischen Klinik in Tübingen.
324. Archiv für Hygiene, Munich.
325. American Analyst, New York.
326. Deutsches Archiv für klinische Medizin, Leipzig.
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328. Archiv für Ohrenheilkunde, Leipzig.
329. Journal de médecine, de chirurgie, et de pharmacologie, Paris.
330. Médecin clinicien, Paris.
331. Der praktische Arzt, Wetzlar.
332. Oesterreichische Badezeitung, Vienna.
333. Blätter für Gesundheitspflege, Berlin.
334. Annales de l'hospice des Quinze-Vingts, Paris.
335. Biologisches Centralblatt, Erlangen.
336. Centralblatt für Chirurgie, Leipzig.
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338. Jenäische Zeitschrift für Naturwissenschaften, Jena.
339. Detroit Emergency Hospital Reports, Detroit.

340. Gazette d'ophtalmologie, Paris.
341. Medizinisch-chirurgisches Centralblatt, Vienna.
342. Journal des sages-femmes, Paris.
343. Monatsblatt für öffentliche Gesundheitspflege, Braunschweig.
344. Zeitschrift für Ohrenheilkunde, Wiesbaden.
345. Annales de thérapeutique médico-chirurgicales, Paris.
346. Annales d'hygiène publique et de médecine légale, Paris.
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348. Montpellier médical, Montpellier, France.
349. Bulletin de la Société de médecine de Rouen.
350. Zeitschrift für Balneologie, Cursalon.
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354. Der Frauenarzt, Berlin.
355. Revista de terapéutica y farmacia, Madrid.
356. Archives de biologie, Gand.
357. Zeitschrift für Therapie, Vienna.
358. Journal de chimie médicale, de pharmacie, de toxicologie et revue de nouvelles scientifiques, nationales et étrangères, Paris.
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361. Annales médico-psychologiques, Paris.
362. Répertoire de pharmacie, Paris.
363. Gazette hebdomadaire de médecine et de chirurgie, Paris.
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365. Centralblatt für die medicinischen Wissenschaften, Berlin.
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368. Archiv für Psychiatrie und Nervenkrankheiten, Berlin.
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370. Hygeia, Stockholm.
371. Nordiskt medicinskt arkiv, Stockholm.
372. Lakäreförenings förhandlingar, Upsala.
373. Hospitals-tidende, Copenhagen.
374. Bibliothek for læger, Copenhagen.
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382. Wiener Klinik, Vienna.
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411. *Der aerztliche Practiker*, Hamburg.
412. *St. George's Hospital Reports*, London.
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415. *Courrier médical*, Paris.
416. *L'électricien*, Paris.
417. *Aerztliches Vereinsblatt für Deutschland*, Leipzig.
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419. *Bulletins et mémoires de la Société de chirurgie*, Paris.
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433. *Concours médical*, Paris.
434. *Gazette des Eaux*, Paris.
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455. *Bulletin de la Société de médecine de Gand*.
456. *Revista de ciencias medicas*, Barcelona.
457. *Archives de médecine expérimentale et d'anatomie pathologique*, Paris.
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461. *Archivi italiani di laringologia*, Naples.
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492. Druggists' Bulletin, Detroit.
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514. Ohio Journal of Dental Science, Toledo.
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520. Gazeta lekarska, Warsaw.
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583. *Nederlandsch Tijdschrift voor Geneeskunde*, Amsterdam.
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792. El Estudio, Mexico.
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829. Pharmaceutical Journal of New South Wales.
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831. Revista de higiene y policia sanitaria, Barcelona.
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836. Annalen der Physik und Chemie, Leipzig.
837. Zeitschrift für Nahrungsmittel Untersuchungen und Hygiene, Vienna.
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839. Bollettino della Società Lancisiana, Rome.
840. Bulletin de la Société impériale des naturalistes, Moscow.
841. British Journal of Dental Science, London.
842. Journal of the British Dental Association, London.
843. Journal de médecine pratique, Paris.
844. Oesterr-ungar. Centralblatt für die medicinischen Wissenschaften, Vienna.
845. Medical Magazine, Lahore, India.
846. Harper Hospital Bulletin, Detroit.
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848. Mémoires couronnés et autres mémoires publiés par l'Académie royale de médecine de Belgique, Bruxelles.
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850. Northwestern Medical Journal, Minneapolis.
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961. *Organ der Taubstummen-Anstalten in Deutschland und den deutschredenden Nachbarländern*, Friedburg.
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